PB-230 577

POLLUTION OF THE INTERSTATE AND INTRASTATE WATERS OF THE UPPER MISSISSIPPI RIVER AND ITS TRIBUTARIES-(MINNESOTA-WISCONSIN). PROCEEDINGS OF PROGRESS EVALUATION MEETING OF CONFERENCE HELD IN MINNEAPOLIS, MINNESOTA ON APRIL 30, 1968

Federal Water Pollution Control Administration
Washington, D. C.

30 April 1968

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PROCEEDINGS

MINNESOTA
MISSISSIPPI
MINNEAPOLIS
RIVER
WISCONSIN

April 30, 1968
Minneapolis, Minnesota

PROGRESS EVALUATION MEETING

In the matter of Pollution of the Interstate and Intrastate Waters of the Upper Mississippi River and its Tributaries—Minnesota-Wisconsin

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DEPARTMENT OF THE INTERIOR

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

- - - -

Conference

- - - -

In the Matter of:

Progress Meeting of the Conference Concerning Pollution of the Interstate and Intrastate Waters of the Upper Mississippi River and its Tributaries (Wisconsin-Minnesota)

April 30, 1968

Minneapolis, Minnesota

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Progress Meeting of the Conference Concerning Pollution of the Interstate and Intrastate Waters of the Upper Mississippi River and its Tributaries (Wisconsin-Minnesota) held at the Leamington Hotel, Minneapolis, Minnesota, on April 30, 1968, at 9:30 a.m.

PRESIDING:

Mr. Murray Stein, Assistant Commissioner for Enforcement, Federal Water Pollution Control Administration, Department of the Interior.

CONFEREES:

H. W. Poston, Regional Director, Great Lakes Region, Federal Water Pollution Control Administration, United States Department of the Interior, Chicago, Illinois

Andrew C. Damon, Legal Counsel, Wisconsin Department of Resource Development, Madison, Wisconsin

Theodore F. Wisniewski, Assistant to the Administrator, Wisconsin Division of Resource Development, Madison, Wisconsin

CONFEREES (Continued):

F. Wayne Packard, Member, Minnesota Pollution Control Agency

Steve J. Gadler, Member, Minnesota Pollution Control Agency

John P. Badalich, Director, Minnesota Pollution Control Agency

Robert C. Tuveson, Chairman, Minnesota Pollution Control Agency

PARTICIPANTS:

Dale Bryson, Acting Director, Minneapolis Program Office, Federal Water Pollution Control Administration, United States Department of the Interior, Minneapolis, Minnesota

Theodore F. Wisniewski, Conferee and Assistant to the Administrator, Division of Resource Development, Department of Natural Resources, State of Wisconsin

John P. Badalich, Conferee and Director, Pollution Control Agency, State of Minnesota

Eugene V. Avery, Chief Engineer, Department of Public Works, City of St. Paul, Minnesota

Donald R. Peterson, City Engineer, City of South St. Paul, Minnesota

PARTICIPANTS (Continued):

Dean E. Abrahamson

C. A. Johannes, Pollution Control Agency, State of Minnesota

Maurice L. Robins, P. E., Chief Chemist and Sanitary Engineer, Minneapolis-St. Paul Sanitary District, St. Paul, Minnesota

Walter Thorpe, Toltz, King, Duvall, Anderson & Associates, Consulting Engineers, St. Paul, Minnesota

Raymond W. Faricy, Jr., Attorney at Law

B. F. Christensen, Vice President of Manufacturing, S. B. Foot Tanning Company, Red Wing, Minnesota

Dr. Demetrius Jelatis, Mayor, Red Wing, Minnesota

Clayton A. Sorenson, Deputy Director of Public Works, Minneapolis, Minnesota

Thomas A. Thompson, Director of Public Works, Minneapolis, Minnesota

William A. Bassett, City Manager, Mankato, Minnesota

Paul L. Twedt, Chemical Engineer, Archer Daniels Midland Co., Mankato, Minnesota

W. V. Lacina, Superintendent, Division of Water and Sanitation, Mankato, Minnesota

L. O. Mayer, General Superintendent, Power Production, Northern States Power Company, Minneapolis, Minnesota

LIST OF ATTENDANCE:

Dean E. Abrahamson, M.D., Ph.D., 1092-25 Avenue, S.E., Minneapolis, Minnesota

H. R. Austin, Plant Superintendent, Cargill, Inc., Savage, Minnesota

Eugene V. Avery, Chief Engineer, City of St. Paul, 234 City Hall, St. Paul, Minnesota

C. M. Bach, Superintendent of Water Treatment, Minneapolis Water Department, 43rd and Marshall, N.E., Minneapolis, Minnesota

John P. Badalich, Conferee, Director, Minnesota Pollution Control Agency, 459 Board of Health Building, University Campus, Minneapolis, Minnesota

Stan Barta, Chief Chemist, Honeymead Products, Inc., Box 29, Mankato, Minnesota

Louis J. Breimhurst, Chief, Field Operations, Minneapolis Program Office, Federal Water Pollution Control Administration, 58th Street and 40th Avenue, S., Minneapolis, Minnesota

Richard A. Brown, V.P., Itasca Engineering, Inc., 12401 Minnetonka Boulevard, Hopkins, Minnesota

Dale S. Bryson, Acting Director, Minneapolis Program Office, Federal Water Pollution Control Administration, 58th Street and 40th Avenue, S., Minneapolis, Minnesota

Karl Burandt, Village Administrator, Inver Grove Heights, Village Hall, Inver Grove Heights, Minnesota

LIST OF ATTENDANCE (Continued):

B. F. Christensen, V. P. Manufacturing, S. B. Foot Tanning Company, Red Wing, Minnesota

C. F. Christensen, Chief Engineer, St. Paul Union Stockyards, 631 Exchange Building, South St. Paul, Minnesota

Bert W. Clark, Environmental Chemist, Northern States Power Company, 414 Nicollet Mall, Minneapolis, Minnesota

T. B. Corlett, Jr., Director, Water Works, City of Minneapolis, 221 City Hall, Minneapolis, Minnesota

Norman H. Cruse, Assistant Secretary, Minnesota Petroleum Council, 604 Exchange Building, Minneapolis, Minnesota

Andrew C. Damon, Conferee, Legal Counsel, Division of Resource Development, Department of Natural Resources, State of Wisconsin, Room 421, 1 W. Wilson, Madison, Wisconsin

Richard A. Emerick, Special Assistant Attorney General, State of Minnesota, State Board of Health Building, Minneapolis, Minnesota

Ray Faricy, Jr., Attorney, Minneapolis-St. Paul Sanitary District, 828 Minnesota Building, St. Paul, Minnesota

Richard W. Ferber, Lab Technician, City of Rochester, Waste Treatment, 1857 - 17th Street, N.W., Rochester, Minnesota

Lew Ferguson, Reporter, Associated Press, 426 Portland Avenue, Minneapolis, Minnesota

Steve J. Gadler, Conferee, Minnesota Pollution Control Agency, 2120 Carter Avenue, St. Paul, Minnesota

LIST OF ATTENDANCE (Continued):

Dennis Gilberts; Supervising Engineer, Northern States Power Company, 414 Nicollet Mall, Minneapolis, Minnesota

Harry C. Grounds, Civil Engineer, Toltz, King, Duvall, Anderson & Associates, St. Paul, Minnesota

William O. Haling, District Representative, Nalco Chemical Company, 5005 Cedar Lake Road, Minneapolis, Minnesota

Robert E. Hansen, Administrator, Dakota County, Courthouse, Hastings, Minnesota

Robert Hanson, Civil Engineer, Portland Cement Association, 1400 Northwestern National Bank, Minneapolis, Minnesota

John Heritage, Reporter, Minneapolis Tribune, 425 Portland Avenue, Minneapolis, Minnesota

Sam Hobbs, Director of Public Works, City of Bloomington, 2215 W. Old Shakopee Road, Bloomington, Minnesota

W. B. Horning, Chief, Laboratory Section, Minneapolis Program Office, Federal Water Pollution Control Administration, 58th Street and 40th Avenue, S., Minneapolis, Minnesota

James W. Hunt, Partner, Van-Doren-Hazard-Stallings-Schnada Consulting Engineers, 1745 University, St. Paul, Minnesota

Walter A. Hurtley, Civil Engineer, City of St. Paul, 234 City Hall, St. Paul, Minnesota

Demetrius G. Jelatis, Mayor, Red Wing, Minnesota

Richard Kienitz, Milwaukee Journal, 2 W. Miffin Street, Madison, Wisconsin

LIST OF ATTENDANCE (Continued):

Charles E. Kiester, Sanitary Engineer, 3M Company, 900 Bush Avenue, St. Paul, Minnesota

W. V. Lacina, Utilities Superintendent, City of Mankato, 202 Jackson, Mankato, Minnesota

Keith O. Larson, Superintendent of Sewage Treatment Plant, City of South St. Paul, Minnesota

Scott E. Linsley, Assistant Engineer, Minneapolis-St. Paul Sanitary District, 2400 Childs Road, St. Paul, Minnesota

Lowell W. Marsh, Executive Secretary, Minneapolis-St. Paul Sanitary District, 2400 Childs Road, St. Paul, Minnesota

Leonard G. Miller, Engineer, Swift & Company, South St. Paul, Minnesota

Robert Miller, Chemist, Northwestern Refining Company, P. O. Drawer 9, St. Paul Park, Minnesota

Clarence C. Oster, Sanitary Engineer, Minneapolis Program Office, Federal Water Pollution Control Administration, 58th Street and 40th Avenue, S., Minneapolis, Minnesota

F. Wayne Packard, Conferee, Member, Minnesota Pollution Control Agency, 4101 West 48th Street, Minneapolis, Minnesota

Mildred J. Paulson, Secretary (Staff), Minnesota-Wisconsin Boundary Area Commission, 619 - 2nd, Hudson, Wisconsin

Donald R. Peterson, City Engineer, South St. Paul, Municipal Building, South St. Paul, Minnesota

LIST OF ATTENDANCE (Continued):

Robert W. Pinkney, President, Pinkney & Associates, Water Systems, Fairchild, 1925 Nicollet Avenue, Minneapolis, Minnesota

H. W. Poston, Conferee, Regional Director, Great Lakes Region, Federal Water Pollution Control Administration, 33 East Congress Parkway, Room 410, Chicago, Illinois

Maurice L. Robins, Chief Chemist and Sanitary Engineer, Minneapolis-St. Paul Sanitary District, 2400 Childs Road, St. Paul, Minnesota

James A. Rowe, Lab Director, Armour & Co., South St. Paul, Minnesota

Marvin J. Schley, Administrative Officer, Minneapolis Program Office, Federal Water Pollution Control Administration, 58th Street and 40th Avenue, S., Minneapolis, Minnesota

Leon J. Schmidt, Superintendent of Utilities, City of Chaska, Chaska, Minnesota

Norman R. Sefer, Technical Director, Great Northern Oil Company, P. O. Box 3596, St. Paul, Minnesota

Walter G. Shifrin, Associate Partner, Horner & Shifrin, Inc., 1221 Locust Street, St. Louis, Missouri

Jim Shoop, Reporter, Minneapolis Star, 425 Portland Avenue, Minneapolis, Minnesota

Lyle H. Smith, Chief, Water Pollution Control Engineer, Minnesota Pollution Control Agency, 459 Board of Health Building,

LIST OF ATTENDANCE (Continued):

University Campus, Minneapolis, Minnesota

M. Stein, Conferee, Assistant Commissioner, Enforcement, Federal Water Pollution Control Administration, Department of the Interior, Washington, D.C. 20242.

Nancy Sutton, Health Planner, Pilot City, 1108 W. Broadway, Minneapolis, Minnesota

John R. Tester, Associate Professor, 394 Museum of Natural History, University of Minnesota, Minneapolis, Minnesota

Walter Thorpe, Engineer, Toltz, King, Duvall, 1408 Pioneer Building, St. Paul, Minnesota

Robert C. Tuveson, Conferee, Member, Minnesota Pollution Control Agency, Albert Lea, Minnesota

Peter Vanderpool, Editorial/Opinion, Minneapolis Tribune, 425 Portland Avenue, Minneapolis, Minnesota

George N. Walker, V.P., Honeymead Products Company, Mankato, Minnesota

George R. Watson, Vice President, Western Oil & Fuel Company, 1400 Lilac Drive, S., Minneapolis, Minnesota

Mrs. Harold Watson, 1st V. P., League of Women Voters of Minnesota, 2140 W. Hoyt Avenue, St. Paul, Minnesota

Roger Williams, Minnesota Department of Conservation, Centennial Building, St. Paul, Minnesota

LIST OF ATTENDANCE (Continued):

Theodore F. Wisniewski, Conferee, Assistant to the Administrator, Division of Resource Development, Wisconsin Department of Natural Resources, Room 421, WSSOB, Madison, Wisconsin

Gordon Yeager, Reporter, Rochester Post-Bulletin, Rochester, Minnesota

PROCEEDINGS

OPENING STATEMENT
BY
MR. MURRAY STEIN

MR. STEIN: This is a meeting of the conferees representing the States of Wisconsin and Minnesota and the United States Department of the Interior. The purpose of this meeting is to evaluate progress toward pollution control in the waters covered by the conference in the matter of pollution of the interstate and intrastate waters of the Upper Mississippi River and its tributaries in the States of Wisconsin and Minnesota.

The first conference session was held under the provisions of the Federal Water Pollution Control Act on February 7-8, 1964, and a second session met on February 28, 1967, March 1, and March 20, 1967.

At the first session of the conference, the conferees unanimously agreed to the following conclusions and recommendations:

1. Pollution in these waters from industries, municipalities and storm overflow sources has created a health

hazard to persons engaging in water contact activities, causes visual nuisances, interferes with fish and fishing, causes sludge banks which give off noxious odors, and floating sludge, and interferes with bottom aquatic life, and with feeding and spawning grounds for fish propagation. This pollution must be abated.

2. The Wisconsin and Minnesota water pollution control agencies have active water pollution control programs. The delays, if any, are those which may be expected to occur in the execution of the pollution abatement program of a large metropolitan area.

3. The Federal water pollution control program, in conjunction with both State agencies and in keeping with State staff and fund limitations, is to conduct an intensive survey of the Mississippi River. Participation is to be on a cooperative basis by all agencies, both on the technical level and in advisory and policy direction capacities. This study project is to include but not be limited to investigation of municipal, industrial, and Federal installation wastes, thermal sources of pollution, agricultural sources of pollution, bulk storage areas, pipelines, barges, coliform bacteria, BOD, suspended solids, sludge deposits, oil, algae, tastes and odors, pesticides, and, with the cooperation of the Corps of Engineers, low

flow augmentation. The study can be modified or expanded at the request of the technical committee.

4. At the suggestion of the Wisconsin conferee, the conferees agreed that the study area be extended to include St. Croix Falls, Wisconsin, and Taylors Falls, Minnesota.

5. The study and report is to be planned and carried out so that features relating to Twin City metropolitan area sewage disposal will be completed, if at all possible, in time to report the findings and recommendations by January 1965, the opening of the 1965 Minnesota State legislature.

The conference was reconvened on February 28, 1967, to consider and evaluate the report of the study findings, and to determine necessary action to be taken in the study area.

At this second session of the conference, the conferees unanimously agreed that: "the quality of the interstate and intrastate waters of the Upper Mississippi River and its tributaries shall be preserved or upgraded, as required, to permit maximum use and full recreational enjoyment of the waters." Recommendations including necessary remedial measures are given in two groups: general and specific.

> "General recommendations cover the broad objectives of pollution abatement in the study project area. Specific recommendations are given for the solution of particular problems and are offered in

addition to, and not in place of, the general recommendations.

"These recommendations represent the initial phase of a long-range and more comprehensive water resource development program for the entire Upper Mississippi River Basin. They apply to problems needing immediate correction.

"The allocation of the permissible loadings of the streams shall be made by the States within the context of their laws and policies."

The conferees unanimously recommended the following time schedule to implement the remedial program for municipalities, installations and industries. The time periods given commence with issuance of the summary of the conference:

a. Submission of preliminary plans for remedial facilities within 6 to 12 months.

b. Submission of final design for remedial facilities within 12 to 24 months.

c. Financing arrangements for municipalities completed and construction started within 18 to 30 months.

d. Construction completed and plants placed into operation within 36 to 48 months.

e. Existing schedules of the State agencies calling for earlier completion dates are to be met.

Opening Statement - Mr. Stein

*The States of Minnesota and Wisconsin recommend that these time intervals be subject, of course, to the appropriation of Federal funds for assistance in meeting the costs of construction at a rate at least as great as that authorized by the 89th Congress.

The conferees recognize that modifications may be necessary. These may include:

a. A lesser time where the control agency having jurisdiction considers that a practical method of control can be in operation prior to the time stated.

b. In a few industries and municipalities some variation from this schedule may be sought from the appropriate State and local pollution control agencies. In such cases, after review, the conferees may make appropriate recommendations to the Secretary of the Interior.

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*Mr. Freeman Holmer, a Wisconsin conferee, indicates that this recommendation would convey his intent more clearly if it read as follows:

> "The State of Minnesota and Wisconsin concurred in recommending the foregoing time tables only if the appropriation of Federal funds for assistance in meeting the costs of construction is at (or greater than) the rate authorized by the 89th Congress."

c. Any modifications of these recommendations requested by those persons or agencies sited herein shall be taken under advisement of the conferees. In such cases, after review, the conferees may make appropriate recommendations to the Secretary of the Interior.

With the large group of conferees we have representing both States, I will ask the conferees to introduce themselves.

First, may we start with the State of Wisconsin?

MR. DAMON: I am Andrew Damon, legal counsel for the Division of Resource Development, Department of Natural Resources.

MR. WISNIEWSKI: I am Ted Wisniewski, Assistant to the Administrator, Division of Resource Development, Department of Natural Resources of Wisconsin.

MR. STEIN: Minnesota?

MR. BADALICH: I am John Badalich, Director, of the Minnesota Pollution Control Agency.

MR. TUVESON: I am Robert Tuveson, Chairman of the Minnesota Pollution Control Agency.

MR. GADLER: I am Steve Gadler, one of the members of the Pollution Control Agency.

MR. PACKARD: And I am Wayne Packard, a member of the Pollution Control Agency.

MR. POSTON: H. W. Poston, Regional Director for the Federal Water Pollution Control Administration, Chicago.

MR. STEIN: And I am Murray Stein. I am from headquarters, Department of the Interior, and the representative of Secretary Udall.

Now a word about the procedures governing the conduct of this meeting. The State and Federal representatives will be called upon to make statements, and they may call upon participants whom they have invited to this meeting. In addition, we may call upon any other interested individuals. At the conclusion of each statement, the conferees will be given an opportunity to comment or ask questions, and at the conclusion of the conferees' comments or questions I may ask a question or two.

Anyone who wishes to be included on the program and make a statement for consideration of the conferees should get in touch with his State conferees, if he has not already done so.

A verbatim transcript will be made of the meeting by Mr. A. M. Zimmer. Mr. Zimmer is making this transcript for the purpose of aiding us in preparing a summary of this meeting and also providing a complete record of what is said here. We will make copies of the summary and transcript available to the Wisconsin Department of Resource Development and the Minnesota Water Pollution Control Commission. We have found that, generally, for the purpose of maintaining relationships within the States, that the people who wish summaries and transcripts should request them through their State water pollution control agency rather than come directly to the Federal Government. The reason for this is that when the meeting has been concluded, we would prefer that the people who are interested in the problem follow their normal relations in dealing with the State rather than the Federal Government on these matters. This has worked successfully in the past, and we will be most pleased to make this material available to Wisconsin and Minnesota for distribution.

I would suggest that anyone, other than the conferees, making a statement, please come to the lectern and announce his name and affiliation before he makes the statement, for the purpose of the record.

In addition, if you have an extra copy of your statement, please give it to the reporter before you start.

Mr. Poston, would you start with the Federal presentation, please?

MR. POSTON: Mr. Dale Bryson, our Minneapolis Program Project Director, will make the presentation this morning.

STATEMENT OF DALE BRYSON, ACTING DIRECTOR, MINNEAPOLIS PROGRAM OFFICE, FEDERAL WATER POLLUTION CONTROL ADMINISTRATION, UNITED STATES DEPARTMENT OF THE INTERIOR, MINNEAPOLIS, MINNESOTA

MR. BRYSON: My name is Dale Bryson. I am the Acting Director of the Minneapolis Program Office, Federal Water Pollution Control Administration.

At the second session of the conference concerning pollution of the interstate and intrastate waters of the Upper Mississippi River and its tributaries (Wisconsin-Minnesota), it was recommended that the conference chairman schedule periodic, public progress report meetings. The action(s) taken by the State and Federal agencies is to be presented at these public meetings. This is the first of the meetings.

The States of Wisconsin and Minnesota will report on the progress in municipal and industrial pollution control activities and the Federal Water Pollution Control Administration will report on progress occurring within the realm of Federal responsibility.

There are two areas of Federal activities to be reported at this time: status of compliance by Federal installation and the monitoring surveillance program as required by the

Secretary of the Interior as a result of the February 28, March 1, and March 20, 1967 session of the conference.

Status of Compliance by Federal Installations

Recommendations 13, 27 through 37 of the Conference Summary -- and there are copies available here -- apply to Federal installations. These recommendations are reinforced by Executive Order 11288, requiring that all Federal installations provide secondary waste treatment facilities as well as providing leadership and direction in pollution abatement.

The recommendations have been and are being satisfied with the exception of Nos. 13 and 30.

Based on data supplied by the U. S. Army Corps of Engineers, recommendation No. 13, dealing with satisfactory waste disposal by Federally licensed watercraft, needs further implementation. Improvement in the operation and efficiency of the two extended aeration facilities on the Dredge Wm. A. Thompson is necessary. However, the macerator-chlorinator type units on the Derrick Boat No. 767 and Office Barges No. 719 and 761 are operating satisfactorily.

Recommendation No. 30 concerns the discharge of effluent to a roadside ditch at Nike Site No. 40, Farmington, Minnesota. A letter dated March 12, 1968, from Headquarters, Fort Sheridan, Office of Post Engineer, signed by William P.

Bannister LTC, CE Post Engineer, indicates that the present outfall sewer line has not been extended so as to discharge the effluent into the unnamed creek, as recommended. The letter further states that this recommendation cannot be implemented within the framework of the time schedule specified in the Conference Summary. The same letter indicates compliance with recommendations 27, 28, 29, 31 and 32.

Surveillance Program

The Federal Water Pollution Control Administration was charged under recommendation No. 6 to establish monitoring stations where appropriate within the study area to aid in the evaluation of improvement of water quality resulting from implementation of actions recommended by the conferees.

Pursuant to the recommendation, three locations for automatic water quality monitoring facilities were selected. These are strategically located to surround the areas of poorest water quality in the vicinity of the Twin Cities. A constant vigil of Mississippi River water quality, entering the metropolitan area, is maintained by the control monitor located in north Minneapolis at the Northern States Power Company's Riverside Power Plant. A second monitor is located on the Minnesota River three and one-half miles above the confluence of the Minnesota and Mississppi Rivers in the metropolitan area. This monitor is located below all waste sources discharged to the Minnesota River and depicts the quality of the water entering the Mississippi River. The third monitor, located at the J. L. Shiely Larson Plant downstream from all waste sources, records the water quality as it leaves the Twin Cities area. Thus, changes in the water quality of the Mississippi River as it passes through the Twin Cities are constantly recorded, permitting continuing evaluation of the improvements in water quality anticipated with implementation of the recommendations.

The automatic monitors were placed in operation during July 1967 and with a minimum of down time have satisfactorily operated continuously. Water is pumped through the monitors and is analyzed by four different sensors for temperature, dissolved oxygen, hydrogen ion concentration and specific conductance. The equipment has been designed to accommodate four additional analyses as sensors are developed and become available.

The information collected by the monitors is telemetered to a central recorder located at the Federal Water Pollution Control Administration Minneapolis office. The maximum and minimum value recorded for each analysis is tabulated on a daily basis. Copies of this data are forwarded routinely to the Minnesota Pollution Control Agency, the Division of Resource Development, Wisconsin Department of

Natural Resources, and the Minneapolis-St. Paul Sanitary District. The data are summarized in graph form and are available for public information, as are all raw data.

Copies of the summaries are before you for the past nine months that the monitors have been in operation.

MR. STEIN: Do you want this included in the record, Mr. Bryson?

MR. BRYSON: No, that will not be necessary. It is available if anybody wants to look at it, or have copies.

MR. STEIN: All right.

MR. BRYSON: In addition to the automatic water quality monitoring program, the Federal Water Pollution Control Administration collected samples from five stations located throughout the study area during the period September through December. The samples were analyzed for total and fecal coliform bacteria densities, dissolved oxygen, temperature and hydrogen ion concentration. During this same period samples were also collected at each monitoring station for total and fecal coliform bacteria determinations.

To implement the nationwide Federal-State-local program to prevent, control and abate water pollution, the Department of the Interior will bring to bear all of its resources and powers to the support of measures which prevent pollution at the source. Wisconsin and Minnesota have both submitted water quality standards and plans for implementation for approval to the Secretary of the Interior as required under the Clean Water Act of 1965. As of this time, the quality standards and implementation plans submitted by Wisconsin have been approved. The submission from Minnesota is in the final stages of approval. With the increased effort and cooperation of the States, it is expected that the quantity of polluting materials discharged to the Mississippi River and its tributaries will be greatly reduced.

Thank you.

MR. STEIN: Thank you, Mr. Bryson.

Are there any comments or questions?

MR. POSTON: I would like Mr. Bryson to elaborate a little bit about Recommendation No. 30 and the inability to comply with the Recommendation No. 30.

Is there some recommendation about this, or some suggestion?

MR. BRYSON: I think on this I will yield to Mr. Riley, who is somewhat more familiar with it. Mr. Riley has been in close touch concerning this recommendation.

MR. STEIN: In order to save time, let me raise one further question on that.

You state: "The letter further states that this recommendation cannot be implemented within the framework of the time schedule specified in the Conference Summary."

What I would like to know is whether this is going to be implemented at all, and when it is going to be implemented, and what we are going to do. This kind of leaves us hanging.

MR. RILEY (William Riley): Mr. Stein, having been in contact with the Department of the Army, Fifth Army Headquarters, concerning this Recommendation No. 30, a project has been instituted that is in its initial stages. Preliminary design and cost estimates will probably be made before July 1. The project will have to be submitted through Army channels to the Congress for appropriations.

The Army feels that they cannot meet the time schedule originally indicated in the Conference Summary because of the Congressional approval required for the money.

MR. STEIN: When do they think they can get this project going?

MR. RILEY: They want to submit the necessary paper work to the Department of the Army before the end of this fiscal year.

MR. STEIN: Does that mean it is going to get into the next fiscal year's budget, or the fiscal year after that?

MR. RILEY: Probably the fiscal year after that.

MR. STEIN: If that is the case, the conferees may want to consider that.

We don't have an Army representative here, do we?

MR. RILEY: No, we don't.

MR. STEIN: I would like to have the views of the conferees, as to whether you want us to take this up with the Department and headquarters, because it seems to me that this delay, at least, raises a question of whether this will be satisfactory to the State program. This is quite a variance from the schedule.

MR. BADALICH: Mr. Stein?

MR. STEIN: Yes.

MR. BADALICH: I think we in the State of Minnesota are faced with the same problem, with appropriations for municipalities, so I don't think it is a very valid excuse, hiding behind the Congressional appropriations. As I say, we do have that problem in municipalities too, with city councils, and so on.

MR. STEIN: I recognize this.

By the way, I do not think that this is that big an item.

MR. BRYSON: They estimate the cost will be approximately $50,000.

MR. STEIN: $50,000? I wonder what percentage that is of the Department of Defense budget. I don't know why they have to go to Congress. Maybe they do.

However, could we reserve this question? I will make a note on this. The conferees may want to think about this, and the Federal conferee too. This basically is a question for the State conferees, as to whether you want us on the Federal level to ask our Secretary to take this up with the Department of the Army to try to get a more expeditious schedule arranged. If you do, we will do it.

I would like to point out, to put this in perspective, that it seems to me most of the installations have done fine. The Federal installations and the Nike sites seem to have complied very well.

Mr. Riley and Mr. Bryson, I think both of you should be commended on that Federal installation program.

Again, while we try to get the Federal installations moving, perhaps if all the rest of the sources were lined up to the extent that the Federal installations are, we would be well ahead.

Thank you very much.

I have one further question, Mr. Bryson.

When do you expect to get that dredge fixed up, that extended aeration facility?

MR. BRYSON: This is just a matter of operation. Evidently, they have had a change in operators of these boats, and it is a matter of training him in the operation of the plant.

This is a short term.

MR. STEIN: All right. Thank you.

Mr. Poston?

MR. POSTON: That is all of our statement at this time.

MR. STEIN: Thank you.

I would now like to call on the visiting State, this time Wisconsin, for its statement.

Mr. Wisniewski?

STATEMENT OF THEODORE F. WISNIEWSKI, CONFEREE AND ASSISTANT TO THE ADMINISTRATOR, DIVISION OF RESOURCE DEVELOPMENT, DEPARTMENT OF NATURAL RESOURCES, STATE OF WISCONSIN

MR. WISNIEWSKI: This is the State of Wisconsin report to the conferees on pollution of the interstate and intrastate waters of the Upper Mississippi River and its tributaries (Wisconsin-Minnesota), April 30, 1968.

On receipt for distribution of a sufficient number of copies of Summary of Conference (Second Session), the Wisconsin Department of Resource Development, now the Division of Resource Development in the State of Wisconsin Department of Natural Resources, on July 20, 1967, transmitted to each Wisconsin community in the area a copy of the Summary of Conference along with a copy of the Interstate Water Quality Standards and Plan for Implementation adopted by the Resource Development Board.

An accompanying letter (sample copy attached) called attention to the applicable General Recommendations and the Schedule for Remedial Program of the summary, and the requirements and timetable for compliance of the Water Quality Standards for Interstate Waters With Report on Implementation and Enforcement.

Subsequent local actions were as follows:

St. Croix River

The City of Hudson reported on August 17, 1967, that all requirements had been met through improvement in digester heating equipment, employment of an additional operator and continuous chlorination of waste treatment plant effluent.

The Village of Osceola retained a consulting engineer to prepare plans for construction of secondary treatment facilities as an addition to the present primary treatment facilities, and on July 31, 1967, made application for Federal grant-in-aid and for State assistance. The Federal grant offer made on January 11, 1968, was accepted by the village on February 6, 1968. It is anticipated that this project will be completed within the specified time limits.

T. F. Wisniewski

The City of St. Croix Falls, through its consulting engineer, on April 5, 1968, submitted a report on an investigation of entrance of clear waters to sanitary sewers. On April 11, 1968, the engineer advised of further investigations and the intent to propose a program of action.

Mississippi River

The Village of Pepin, following an exchange of communications, reported on February 22, 1968, that it had retained a consulting engineer to prepare plans and specifications for secondary treatment addition to the present primary plant. The village clerk advised that the construction completion date of October 1, 1970, will be met. Forms of application for Federal grant-in-aid and for State assistance have been furnished to the Village of Pepin.

The City of Prescott on April 25, 1968, submitted a copy of a letter from its clerk to a consulting engineering firm directing the firm to conduct a study for design of a secondary treatment plant to meet State requirements.

Respectfully submitted, Freeman Holmer, Administrator of the Wisconsin Department of Natural Resources, Division of Resource Development.

MR. STEIN: Thank you, Mr. Wisniewski.

Are there any comments or questions?

(No response.)

MR. STEIN: I have one or two points for clarification.

This is a pretty typical report of a fairly good compliance program in a State. In other words, we have Hudson and Osceola moving ahead. In fact, all are moving ahead, but those are well within all of the requirements of the schedule.

When will you get a report from St. Croix Falls on a proposal for their program of action on the sanitary sewers?

MR. WISNIEWSKI: Our consulting engineer has held meetings with the City Council with reference to developing a program of action. This program of action naturally has to be related to some highway relocation in that particular area, and this part of the program is going first. This is a stormwater separation program.

Their program has until October 1977 for its completion date, according to plans and implementation on the interstate waters of the Mississippi River, so that we are pretty sure that they will get that clear water separation program corrected.

To give you an example of the problem we run into there, the spring runs into one of the city streets that runs into a catch basin that goes into a sanitary sewer. This naturally contributes quite a bit of clear water, and this spring is now going to be diverted out from this area without going through the sanitary sewer.

MR. STEIN: As I understand it, just to set this up for reporting purposes, Mr. Wisniewski, they really do have a program for separation. The problem that they have is one that I think almost every town, big or small, faces. You have to coordinate that with the road program in particular, and other programs as well.

Do you think that there will be a resolution of that by anything that the water pollution control people will do in St. Croix Falls, or will it have to wait for the road problem to be resolved before the next determination can be made?

MR. WISNIEWSKI: No. The road problem is pretty well resolved. They know where it is going and where the changes will have to be.

MR. STEIN: I see the Village of Pepin is in full compliance.

Do you know when you can expect the City of Prescott to come up with a proposal for a secondary treatment plant?

MR. WISNIEWSKI: I would anticipate that they would have plans plus applications for both State and Federal grant and aid in by the latest in August 1969. We looked forward to August 1, 1968, but I don't know whether they can meet that date.

MR. STEIN: Are there any other questions or comments?

(No response.)

MR. STEIN: Do you want this letter made part of the record?

MR. WISNIEWSKI: It can be made part of the record.

MR. STEIN: Without objection, the letter attached to Mr. Wisniewski's statement will be included in the record as if read.

(The letter referred to is as follows:)

"July 20, 1967

"Mr. Gordon M. Johnson
City Clerk
Prescott, Wisconsin

"Dear Mr. Johnson:

"Enclosed is a copy of 'Summary of Conference (Second Session), Pollution of the Interstate and Intrastate Waters of the Upper Mississippi River and its Tributaries (Wisconsin-Minnesota).'

"Your attention is called to the General Recommendations on pages 5 through 8 and the Schedule for Remedial Program on page 12.

"The enclosed 'Water Quality Standards for Interstate Waters With Report on Implementation and Enforcement' on page 7 provides that the City of Prescott shall "complete construction of secondary treatment facilities by October 1, 1970.

"Your cooperation in acknowledging receipt of this letter and reports will be appreciated along with information on action taken to comply with the requirements.

"Very truly yours,
Freeman Holmer
Director

"FH:W:M

Enclosures

cc to:

C. Kozel, Region 5

H. Poston, Chicago"

MR. STEIN: Does Wisconsin have anything further?

MR. WISNIEWSKI: If there is anyone from Wisconsin in the audience who would like to present any information, I would appreciate it if they would do it now.

(No response.)

MR. STEIN: Thank you.

We will now call on the State of Minnesota.

Mr. Badalich.

STATEMENT OF JOHN P. BADALICH, CONFEREE AND DIRECTOR, POLLUTION CONTROL AGENCY, STATE OF MINNESOTA

MR. BADALICH: Mr. Stein, Fellow Conferees:

I am afraid the State of Minnesota is not going to be as brief as the State of Wisconsin. Maybe it is because we have more dischargers in the State of Minnesota, but we feel that we have a report here and we would like to bring out all the facets and all the recommendations that have been fulfilled since the last conference, held about a year ago.

This is a statement for the Federal-State progress evaluation meeting on pollution of the Upper Mississippi River, Minneapolis, April 30, 1968.

The Minnesota Pollution Control Agency appreciates the opportunity to participate in this meeting and set forth for the record certain organizational changes in responsibility for water pollution control in Minnesota, as well as to present a summary of Minnesota's progress in construction of sewage and waste disposal facilities in this area since the second session of the conference, which was held in February and March 1967.

The Legislature, in May 1967, created the Agency and abolished its predecessor, the Water Pollution Control

Commission. The Agency was given all of the powers and duties of the Commission, plus added responsibilities in regard to air pollution, solid waste disposal, and land-use planning as it relates to pollution. The Agency's funding and operation were separated from the Department of Health, as compared with the former Commission which had no funds or staff of its own.

The Agency members were appointed by Governor LeVander and began their duties in August 1967. I, as the Director, who is also appointed by Governor LeVander, assumed my duties on November 1, 1967. In order to assure representation at this meeting by the Agency which presently has the responsibility for carrying out the State's water pollution control program, the original conferees have been replaced. The conferees now are Mr. Robert C. Tuveson, Chairman of the Agency; Messrs. Steve J. Gadler and F. Wayne Packard, Agency members, and I, as the Director of the Agency.

Considerable progress has been made since the previous conference toward fulfillment of the recommendations contained in the conference summary dated June 17, 1967. The existing standards for these waters (Regulations WPC 1, 2 and 3) were submitted to Secretary Udall by Governor LeVander as part of Minnesota's proposed interstate water quality standards on June 30, 1967, and our proposal also included recognition of the conference recommendations, as well. Since submission of our proposed interstate standards, numerous meetings have taken place with personnel of the Federal Water Pollution Control Administration and others concerned regarding revisions. It is our understanding that at present we have reached agreement on all but a few items and that prospects for early approval of the standards by the Secretary appear to be rather good. The changes under discussion will include these waters, for which standards had previously been established, as well as any unclassified waters.

The following comments are given in the same order and refer to the identically numbered recommendation in the Summary of June 17, 1967. You may wish to have the recommendations before you as you follow my comments.

1. Existing high quality waters were given particular attention in our proposed interstate standards and these waters were classified at levels to insure that adequate protection is afforded against degradation.
2. These are incorporated by reference in our interstate standards proposal.
3. This treatment requirement has been used by the Agency as a minimum requirement throughout the conference area and more stringent effluent standards are being adopted where necessary. This is elaborated upon in items 16 and 25 which follow, and in Attachments A, B, C and D

(which are WPC 18, 19, 20 and 21, our proposed effluent standards.) These regulations, which probably will be adopted in the very near future, require installation of treatment works sufficient to satisfy the general as well as the specific recommendations. The necessary public hearing has already been completed. This was accomplished on May 28th, 1967.

4. There are now fifteen municipal or similar sources on the main stems in the conference area for which regular monthly reports are being provided. These are: Anoka, Burnsville, Cedar Grove, Chaska, Cottage Grove, Inver Grove Heights, Mankato, the Minneapolis-St. Paul Sanitary District (MSSD), Newport, Red Wing, St. Paul Park, Savage, Shakopee, South St. Paul and Stillwater. Letters were recently mailed to the other delinquent sources reminding them again of the requirement for monthly reporting. We intend to achieve 100 percent compliance with this recommendation at an early date.

5. It is the policy of the Agency to require adequate capacity and maximum flexibility of individual treatment units in the design of all municipal waste treatment facilities. Every effort will be made to optimize nutrient removal when satisfactory and economical solutions have been developed.

6. The Implementation Plan of the proposed interstate standards includes a water quality monitoring program designed to provide information on how the standards are being met, and to identify existing or potential trouble spots. Minnesota has had an active State-wide water quality monitoring program since 1953, and in 1967 the program was markedly expanded to put considerably more emphasis on the interstate waters. The program now includes 87 surface water quality monitoring stations at which sampling is done at least bi-monthly. Eight of these stations are located in the conference area on the named waters and there are also several stations on tributaries in the area. Certain modifications have been requested by the Federal Water Pollution Control Administration (FWPCA) for inclusion in our FY69 Program Plan, mainly aimed at reducing the number of stations and increasing the frequency of sampling. The desired adjustments will be made, and the program will be reviewed periodically to provide for any changes in conditions. The program is fully described in Attachment E.

7. It was the policy of this Agency to require design of sewerage and sewage treatment facilities to minimize by-passing of untreated wastes. Municipalities have been notified to report accidental or emergency by-passing immediately.

8. The St. Paul Water Department has informed us that the sludge is no longer discharged into the municipal sewer. The Minneapolis-St. Paul Sanitary District has been requested to undertake a study aimed at reduction of detrimental effects from industrial wastes, and we understand that St. Paul is also undertaking a study of this kind.

9. Minnesota has had in effect for a number of years a regulation for control of stored liquids capable of polluting waters of the State. However, the legislation recommended to enable compliance with Recommendation 9d did not pass the Legislature in 1967. It will be proposed again. We have received plans for 15 liquid storage sites in the conference area. Four permits have been approved since March 1967.

10. The Agency does not normally approve permit applications for combined sewers. St. Paul has agreed to the concept of a broad program of improvements to existing combined sewers and operating procedures together with partial sewer separation, as the first stage toward elimination of sewage overflows directly to the river. It is understood that the City has contracted with private consultants for the necessary studies. City officials indicate that they are willing to cooperate in this program but

are not optimistic that the city will be able financially to separate completely all of its combined sewers by June 1971.

I believe the representative of the City of St. Paul is here this morning and he will speak later.

Minneapolis has had a sewer separation program in effect for many years, and reports that they have a ten-year program currently under consideration which would result in 100 percent elimination of combined sewers at the end of that period. South St. Paul has indicated that it probably will provide treatment for all of its combined flows rather than separate the existing combined sewers. They presently are involved in research and studies on surface and underground storage of combined wastes. Monitoring of combined sewer outfalls is done for both Minneapolis and St. Paul by the MSSD and the results are reported to this Agency. The District is also proceeding under an FWPCA grant with a special project on the use of the interceptors for storage so as to avoid overflow to the river.

11. The Agency has a policy of requiring an equal effluent concentration of all sources discharging to common waters. The treatment works design period is included in arriving at the effluent concentration, therefore at any particular

time the actual concentration of each of the effluents in the area may not be equal but all will be at or below the maximum allowable concentration. The 5 milligrams per liter total settleable solids limit was not included directly in proposed Regulations WPC 18-21, but this item is considered to be adequately covered by the limit of 30 milligrams per liter (mg/l) on suspended solids. The application of the coliform standard to industrial wastes is to be as stated, but to our knowledge no such special studies have as yet been undertaken or proposed by the FWPCA. We urge that the application of this recommendation be clarified.

12. Ten industries in the conference area are now submitting regular monthly reports. These represent mainly the larger sources of wastes. Recently the delinquent industries were reminded again of this requirement to furnish monthly reports and additional emphasis is being placed on obtaining 100 percent compliance in the very near future. The industries currently submitting reports are the American Crystal Sugar Company, Cargill, the M. A. Gedney Company, the Great Northern Oil Company, Honeymead Products Company, the Minneapolis Water Department, Northwestern Refining Company, St. Paul Ammonia Products, the S. B. Foot Tanning Company and the Hudson Manufacturing Company.

13. In the fall of 1967 letters were sent to the owners of 195 documented vessels which are registered with the St. Paul office of the Coast Guard, and also to approximately 70 towing companies, notifying them of this recommendation. We have been advised by our legal counsel that the Agency, under our existing boat head law, probably does not have authority to require installations on non-Minnesota licensed craft. Based on our recent and previous experience with this problem we wish to reiterate our belief that it is not realistic to expect a State to exert control over watercraft which are not licensed by that State, but are instead documented or registered by the Federal Government. Control over watercraft of this kind, as well as foreign vessels, should be exercised primarily by the Federal agencies having jurisdiction rather than by the States.

Further, it is our understanding that the National Sanitation Foundation has undertaken studies, supported by an FWPCA research and development grant, and has recently published recommendations for minimum criteria applying to marine sewage treatment devices. We endorse these criteria and urge that the conferees do the same for application to the interstate Minnesota-Wisconsin boundary waters under consideration here today, so that

Minnesota boaters, when in Minnesota waters, will not continue to be harassed by unreasonable extension of Wisconsin requirements into waters over which Wisconsin does not have sole jurisdiction. We ask only that we be given full faith and credit for our control measures when used in our waters as we do to others, and strongly urge adoption of a recommendation for a reciprocal arrangement to this end.

14. Cooperation has been demonstrated by the owners of six dumps located in the river flood plains. One of the dumps has been abandoned and the area improved for a city park, and two more are being relocated to more satisfactory sites. The other three have been greatly improved in operation and appearance. Possibly the most noteworthy from the viewpoint of the Conferees is the improvement in refuse disposal operations made by the City of St. Paul, which has changed from an open dump to a sanitary landfill.

15. Notification concerning this recommendation was given to approximately 16 upstream sources, and effluent reports are being furnished monthly by four of these sources at present. It is our intention to require upgrading of treatment where necessary as a part of the hearings and other procedures planned for carrying out the

Implementation and Enforcement Plan of the proposed interstate standards as soon as they are approved by the Secretary.

16. The matter of allowable biochemical oxygen demand (BOD) loadings on the reach of the Mississippi River below the MSSD outfall has been the subject of much discussion. Dr. Tsivoglou, of Georgia Tech, was consulted at the suggestion of the Chairman, and met with our staff and the MSSD staff and their consultant to review this matter. The meetings did not result in any agreement, but the 68,500 lbs. of BOD was used by the Agency staff in calculating the permissible effluent concentration of 35 mg/l for this reach of the river, as specified in our proposed Regulation WPC 18. The suspended solids limitation is covered by the proposed effluent standard of 30 mg/l, which will result in discharges substantially below the recommended maximum of 85,500 pounds.

Since the MSSD will later present a statement on the status of their program, I shall not comment on it now except to note that recent events concerning the lifting of limitations on their bonding capability are most encouraging and we fully expect that any remaining problems will be resolved soon.

17. This matter has not yet been resolved and probably cannot

be for some time, because the MSSD treatment works referred to have not yet been placed in full operation. We suggest that further consideration of this item be deferred for at least two to three years in order to allow the river to reach a new stage of equilibrium after completion of these works.

18. In a memorandum dated November 22, 1967, the MSSD indicated that the practice of by-passing sewage from the joint interceptor to permit inspection of the inverted siphon approximately one mile north of their treatment plant had been discontinued. The report did not indicate whether or not the recommended engineering study would be undertaken.

19. A four-day survey of the Hastings sewage plant was made in May 1967. The results showed that the efficiency of the plant was poor, and recommendations for improvements were made to the city consulting engineer. It is expected that new secondary treatment facilities, which are now under construction here, will be completed this year.

20. Minneapolis, on December 20, 1967, indicated that it has provided funds for a disposal system which will eliminate the discharge of filter backwash and also for construction of a chemical recovery plant to eliminate the discharge of

their sludge.

21. It was reported by Armour and Company that in-plant changes have been made to substantially reduce their waste volume, and segregate manure for separate disposal, so that all plant wastes except clean cooling water can be discharged into the South St. Paul sanitary sewer system.

A sewer is currently under construction at Swift and Company designed to divert all plant wastes except clean cooling water into the municipal sanitary sewer. It is anticipated by the company that with completion and use of this sewer, disposal of wastes at this plant will be satisfactory.

St. Paul Union Stockyards officials, on April 9, indicated that service connections to the municipal sanitary sewer have been constructed and that all wastes will be diverted to the municipality as soon as treatment capacity is available from the city.

22. Cenex, Inc., submitted plans for improvements on March 8, 1968. A preliminary review indicates that the proposed facilities will satisfy the recommendations. This plant is being taken out of production at present.

23. The S. B. Foot Tanning Company has joined with Red Wing in an application for a Federal research and development

grant for design and construction of treatment facilities. On February 27, 1968, the company submitted a brief resume of their progress toward securing the grant.

24. The Green Giant Company has diverted its sewage into the municipal sanitary sewer, and has installed a stand-by pump for the industrial waste disposal system.

25. An aerator was installed in the sludge pond of the American Crystal Sugar Company prior to the 1967 campaign in order to reduce odors, and efforts are continuing with in-plant controls to further reduce BOD losses in the condenser water.

26. The Rahr Malting Company has installed screens and an equalization tank to reduce their suspended solids discharge, and negotiations are being carried on with Shakopee to discharge the plant wastes into the city system.

The allowable loading for the river below Chaska has been the subject recently of further calculations by the FWPCA and Agency staffs to arrive at new effluent standards based on the proposed use of the river by adjacent communities. The proposals include an application by the Bloomington-Eagan-Burnsville Pollution Control District for a treatment plant at approximately mile 7, and the Southwest Sanitary Sewer District application to increase the original Minnetonka permit from 25,000 connected

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population to 75,000. Proposed Regulation WPC 19 would require an effluent BOD of 25 mg/l in this reach. However, if the above applications are granted in full, the effluent standard may have to be substantially lower in order to stay within the specified river loading. No final decision has been made regarding the applications as of this date.

27. On September 14, 1967, the Northern States Power Company stated that the cooling pond at the Black Dog plant was being utilized to its fullest extent from May through October, and that the discharge limitation was not being exceeded. It appears that this plant is in compliance with the recommendation. This is basically an operational matter and the company can comply with the existing standards. It should be noted, however, that new temperature limits were not proposed for inclusion in our effluent standards at this time because no decision has yet been reached by Secretary Udall on our proposed interstate standards. We have been proceeding under the impression that wherever there may occur an apparent conflict between the recommendations resulting from an enforcement conference such as this and our proposed interstate standards in their current stage of agreement, the interstate standards provisions are to take precedence. Mr. Chairman, if this is not correct I would appreciate being so advised by you at this conference.

MR. STEIN: Let me interrupt right here. We have had one case of this kind in Illinois and Indiana. As I read the Secretary's statement, he is staying with the enforcement conference recommendations rather than accepting the proposed water quality standards, although he may do the other, but this has not proved to be the case.

In order not to get into this dilemma, I think we have to be sure that the conference recommendations and the recommendations we get on the standards are identical. If they are not, the Secretary is going to have to make a determination, and I don't know that any Secretary likes to do that, between two contradictory operations.

You can be assured that if any recommendation here is made, the Secretary makes these recommendations and is the man who approves the standards, so I don't think they are going to be any different. So, if you want to make a proposal, do it this way.

I don't want to put any precedents over the standards or the enforcement conference. You cannot generalize on the basis of one case either, which we have. However, my notion is that when there is a conflict, you are probably going to find tremendous pressures for adopting the most restrictive one, whether these are included in the conference or in the standards.

I do not think that whether they appear in the standards or an enforcement conference really is the deciding issue. The issue really is what is going to be required, and once you come up with a more stringent requirement, the notion is that if you talk for the easier one, you are relaxing your pollution control, and it becomes very difficult to do that.

Gentlemen, let me make this clear. If it is not clear, I will repeat it.

I do not think the procedural aspects are the ones that are going to govern if there is a difference in requirement, whether the requirement comes up in an enforcement conference, or whether the requirement comes up in the development of the standards. The Secretary who evaluates these is going to look at the specific requirements that came out of each. In the case we had, he went along with the more rigid one, rather than the easier one, and I don't think where it came from was the governing factor. The governing factor was the substantive proposal, and which was more restricting than the other?

MR. BADALICH: I think that answers what I am concerned with.

MR. STEIN: All right. Go right ahead.

MR. BADALICH: Let me continue with the summary.

Based on the listing of the 55 Minnesota sources of sewage or industrial wastes, which was published in the Summary Report of the Twin Cities-Upper Mississippi River Project on

Page 23 of the Conclusions, and the recommendations published in the Conference Summary of June 17, 1967, it appears that all of those listed are in substantial conformance with respect to interstate waters insofar as present treatment capability is concerned, except the following:

Mississippi River

1. Anoka
2. Minneapolis Water Department
3. Minneapolis-St. Paul Sanitary District
4. Swift and Company
5. Union Stockyards Company
6. Armour and Company
7. South St. Paul
8. Northwestern Refining Company
9. St. Paul Park
10. Cottage Grove
11. Minnesota Mining and Mfg. Co.
12. Hastings

Minnesota River

1. Honeymead Products Company
2. Mankato
3. Henderson
4. M. A. Gedney Company
5. American Crystal Sugar Co.

6. Rahr Malting Company
7. Shakopee

St. Croix River

1. Stillwater

Thus, there remain now only 20 significant sources to be reduced, or put in another way, 64 percent of the sources originally listed have either made sufficient improvement in their treatment in the past two years to become satisfactory or do not discharge wastes of any significance to interstate waters. In addition, action is either underway or positive commitments to proceed with adequate disposal works have been received from:

1. Anoka
2. Minneapolis Water Department
3. Swift and Company
4. Union Stockyards Company
5. Armour & Company
6. South St. Paul
7. Cottage Grove
8. Hastings
9. Stillwater

In the interest of brevity, we have discussed in this statement only those sources specifically mentioned in the recommendations or others which for one reason or another seemed to warrant special mention. However, information on any other sources, whether satisfactory, unchanged, and so on, also will be furnished as may be desired.

It is the consensus of the Agency that Minnesota's record speaks for itself, and that the progress made in providing sewage and waste treatment works in this area has been most encouraging. Where progress has been lacking you can be assured, Mr. Chairman, that the Agency is pursuing whatever courses are necessary to enable us to achieve early conformance with the recommendations to the end that the quality of these waters will be maintained and enhanced for all proper uses now and in the future.

Respectfully submitted by myself.

MR. STEIN: Thank you for a very comprehensive statement, Mr. Badalich.

Before we throw this open for comments and questions, I would like to make one with relation to enforcement conference techniques and what we do in the standards.

This is going to be very much a part of the activities in the dealings of the Federal and State people from now on.

Just recently we had a four-State conference, which you probably are well aware of, and which the Wisconsin people participated in, on Lake Michigan.

We came up with a requirement on phosphate removal there which was stricter than the standards approved by the four States, just within a month or two previously. There was a modification made by the States unanimously right there and then.

Just last week, we were out on Long Island, where we had the duck farmers and the oystermen. They are not exactly compatible. We made some adjustments in the requirements and schedules there again, and these were adjustments in the time schedule.

I suspect that once the standards are set, once we have this progress made and we make any changes, we will find ourselves in the process of constantly changing or amending these.

I would like to give you one analogy to this, very much like your own program.

Where you have a set of interim dates or negotiations with a goal, where you have to make an adjustment of the interim date or the way you are going to do it, essentially what you are doing is, if you have an active program, that you are constantly amending it and changing it, and I suspect that all these meetings or conferences that we have will be doing that.

May I make another suggestion, and I hope we will be able to do it this way: Where there are any differences -- and there are bound to be, technical or otherwise -- between one set of requirements in the Federal-State program that we have agreed to, or what the States have done in their programs, we will have to constantly have a period of adjustment. I would imagine that the most equitable way to do this would be with periodic meetings of this type, where we can get together and discuss this and put our recommendations forward to the Secretary, letting the interested parties in the localities involved know, so they can see what we are doing.

In any event, I think this is probably going to be a more satisfactory way of proceeding, rather than having an arm's length dealing with letters from Washington here, and back and forth, and with delegations meeting, because we have always been able to come to an agreement with the States. I think this is going to be the pattern of Federal-State relationships in water pollution control as we go on. I suspect that every one of these meetings, and possibly even this one, may in one way or the other either modify the standards or modify what we have done at the previous enforcement conference.

With that, I will call for comments or questions.

MR. BADALICH: Mr. Chairman, I was just wondering if there were any comments on the presentation here, because I do have municipalities to call on.

MR. STEIN: I have some comments, if no one else does.

On Page 5, you use the honor roll system in indicating ten industries in the conference area submitting reports, and you state: "Recently the delinquent industries were reminded again of this requirement to furnish monthly reports," but you did not list the delinquent industries. I guess someone can go back to find out who the delinquent industries are. We only have the good guys here.

I have one other comment, and this is for the purpose of clarification.

On Page 8, on packinghouse wastes, you talk about Armour & Company segregating manure for separate disposal, so that all plant wastes except clean cooling water can be discharged into the South St. Paul sanitary sewer.

Then you talk about Swift and Company and you say that all wastes at this plant except clean cooling water will go to the municipal sewer system.

Is there any paunch manure involved in that waste, where the city sewer system is going to take it, or manure?

MR. BADALICH: Mr. Stein, maybe the City of South St. Paul may answer this a little more fully, but there was a research program going on on the removal of paunch at the plant, and it is being fed back to cattle, and so on. This process, as I understand, is still in the experimental stage. Whether it has proved successful or not, I can't say.

MR. STEIN: What I am looking for is clarification of the record. This is all I am asking for at this point.

You say that Armour & Company segregates manure for separate disposal. The question is, does that include paunch manure?

What are Swift & Company and the St. Paul Union Stockyard officials doing about manure and paunch manure? Is that going into the sewers, or is it being presently removed separately?

Your report is not that clear.

MR. BADALICH: Presently most of it is going into the sewer, but, as I mentioned, there is an experimental process being evaluated there by the cattle houses, taking the paunch and feeding it back to the animals on a farm operation. Actually, with reference to the paunch or the food in the stomach, that very definitely goes into the sewer.

MR. STEIN: In other words, at Armour, paunch manure is going into the sewers?

MR. BADALICH: Partially.

MR. STEIN: Partially?

MR. BADALICH: Right.

MR. STEIN: And some of it is being trucked away?

MR. BADALICH: That is right.

MR. STEIN: Is that part of the demonstration project?

MR. BADALICH: Yes.

MR. STEIN: All right.

I don't know how many people are familiar with the packing industries, but for those who do not know what paunch manure is, this is not really manure in the sense that you generally consider animal manure. This is the content of the animal which is partially digested.

Without going into the anatomy of cattle, there is a digestive process and then an absorptive process that takes place in the stomach of the animal.

This is a pretty strong waste and adds quite a large BOD loading to any plant that is going to absorb it.

The theory is that when the cattle under the present system are fed rather well and there is a lot of partially digested food, this can be removed at the source and a disinfection or sterilization process can be made. You can take this material and possibly add it to some feed additives, or by itself, and feed it back to the cattle in the feedlots, and it would be a really nutritional food. This is what we are trying to do.

Now, on Pages 10 and 11 --

MR. BADALICH: Mr. Stein, if I may interrupt, another word for paunch manure is "rumen."

MR. STEIN: Yes, rumen content.

As you know, and Ted Wisniewski knows, I came up, like most of us, and most of us came up from health departments, from the Public Health Service, and years ago I used to work on vital statistics records, among other things. One of the problems, of course, that we used to have was working with the undertakers.

There is a lot of law on that, keeping the vital records and transporting bodies, when they are dead, across State lines, and there are a tremendous amount of regulations.

Whenever we would go to the undertakers' meetings, the big issue used to be: Couldn't we change the word "undertaker" in every law to "funeral director"? Couldn't we change "coffin" to "casket"? Couldn't we change "body" to "remains," and get all these nice euphemisms worked in?

We used to resist that and tell them to put that in their institutional ads, because if we changed the words, we would probably have to try all the cases over again where we have established the law.

I know that a lot of people like to call paunch manure "rumen content," but, as I pointed out, it is not. You take the choice on your style of words.

Can we get to Pages 10 and 11?

You have indicated on Page 10: "It appears that all of those listed are in substantial conformance with respect to interstate waters, except the following," and then you have a list of twenty industries and municipalities. Then you indicated those that either had action under way, or positive commitments to do this, and there were nine, which still leaves eleven.

That is just like an honor roll. If you put them both together, the way I have done it here, we come up with a list of those that you have indicated who are not in compliance and have not qualified for your list of having action either under way or positive commitments to proceed with adequate disposal works.

This list of those who are not in compliance and have not come forward with a proposal includes, as far as I read it:

Minneapolis-St. Paul Sanitary District
Northwestern Refining Company
St. Paul Park
Minnesota Mining and Manufacturing Company
Honeymead Products Company
Mankato
Henderson
M. A. Gedney Company
American Crystal Sugar Company
Rahr Malting Company
Shakopee.

If there is any mistake, I would like to know it, but I think your report is clear and speaks for itself.

Are there any other comments or questions?

MR. WISNIEWSKI: Yes, I have a question.

On Page 3, Item 8 reads:

"The St. Paul Water Department has informed us that the sludge is no longer discharged into the municipal sewer."

Where is the sludge discharged?

MR. BADALICH: Mr. Wisniewski, we are informed that it is put into sludge lagoons.

MR. WISNIEWSKI: Which overflow to the river?

MR. BADALICH: No, not as far as we know, sir. They are quite removed from the river and the filtration plants.

MR. STEIN: Mr. Poston?

MR. POSTON: I note that you had a couple of comments with reference to boats, one being that the National Sanitation Foundation prescribes the minimum criteria.

It is my understanding that the National Sanitation Foundation studies pertain to development of criteria for testing of marine sewage treatment devices.

The Federal Water Pollution Control Administration has submitted a report to the Congress and hearings are being held at the present time on Federal legislation with respect to waste treatment from watercraft. These hearings are being held with a view that there will be some type of Federal legislation. They have had considerable testimony on this.

I might say additionally that as a result of our conference on Lake Michigan, the conferees agreed that there should be no over-the-side discharge of waste into Lake Michigan, whether it be trash or sewage, and they are developing a recommendation to the various State agencies for adoption by the State legislatures.

The State of Michigan has already developed a law for discharge of wastes from pleasurecraft, and this prohibits the discharge of wastes from pleasurecraft. In other words, it would require holding tanks.

I would look forward to this being a requirement by all the four States, and there is every indication that in the case of Lake Michigan this will come about.

I know that at the time this conference discussed the matter of boats, it was decided that we would leave this up to the individual States, and, as Mr. Badalich has indicated now, we have a problem with boats from Minnesota getting into Wisconsin waters, and Wisconsin wanting the requirements that they have in their waters complied with.

I don't know what the answer to this is, or what the conferees want to decide here, but I feel that it is a matter of time for the requirement that all boats on interstate waters will be required to have holding tanks, with provisions at marinas for containing and receiving these wastes.

MR. BADALICH: Mr. Poston, on our criteria, we do recognize holding devices or holding tanks, but we also recognize the chlorinator-macerator type of equipment. Both of these are allowed in our State regulations, but Wisconsin only has the holding device.

We are running into a problem primarily here, Mr. Poston, on the basis that our law does exclude the Federally documented and licensed boats, and I have been getting harassed by some people asking, "Why should we take out a Minnesota license when we can just as well take out a Federal license and be excluded from the law which requires a boat head?" This is where we run into a great problem.

I wish we could get some Federal support, because I think it is one area where the Federal Government should probably step in.

MR. POSTON: I think this is a very good suggestion. Under our 11-288, I think we might at least make every effort, at the time the Federal license is given, to require that there also be compliance with State standards at the point of registration.

I will follow that up on my part and see what can be done.

I know this has been the subject of conversation in other conference areas, and there hasn't been a desire on the part of the Coast Guard to make this a Federal requirement, but we can proceed with it.

MR. STEIN: This is a very complicated issue.

I don't know that the conferees, particularly in these two States. are going to be in a position to resolve this in the way we did in the Great Lakes, where everyone had the operation lined up. There are many, many complications here. I suggest that we take it on.

Let me just point out a few of the complications. As you well know, there is proposed Federal legislation to control this, but this is not a very easy thing to get at.

If we have a Federal requirement, Mr. Poston, that the boat comply with the State standards for each State, which State do you pick if the standards are not uniform?

As you well know, we have the same problem with the bigger boats that Mr. Badalich is having with the State boats, where they say, "We have to put a head on the boat if we take out a Minnesota license. Why shouldn't we take a Federal license?"

We may be faced with the same situation if we try to have a requirement from the Federal Government, where the boat owners will say, "Why shouldn't we take out a foreign flag license?"

I think this is something we are going to have to work on, and work out very, very carefully. I am not sure we are going to be able to do this with the two States, where we have different regulations.

I think the best we could try to work out is some reasonable way that Wisconsin and Minnesota can live with each other until we come up with a program that we know is going to work with the States and the Federal Government.

MR. GADLER: Who controls the boats that come in on the big lakes, as, for example, foreign boats, that come to Duluth?

MR. POSTON: I think this depends somewhat for what purpose you are talking. There is a joint Federal-Canadian authorization which depends on the first contact that the boats from foreign ports make.

MR. GADLER: What prevents them from discharging into Lake Superior?

MR. STEIN: You can't. There are international quarantine regulations, and we have interstate quarantine regulations.

I have worked with this problem for many years. This is a most vexing problem.

The Canadians, for example, tried to solve this in a way, and probably they have done as good a job as you can in getting the boats in the docks and requiring them to take these cans, sort of like big refuse and trash cans, and putting all their refuse in it, and not dumping it overboard.

At least, that stops your finding orange rinds and grapefruit peels coming up on the beaches. However, as you know, this is an esthetic problem and it really does not get to the heart of the pollution problem.

If you take one of these ocean-going boats, either a North American boat or a foreign boat, you can't find all the pipes that the waste is coming out of. There may be twenty, thirty or forty or fifty on the boat, and then there isn't any room to try to get a pipe in. It is not like a city or a factory, where you can gather them together.

Even if you have a dock requirement where a boat comes into a dock and you require it to pipe to a shore installation and take it up, you cannot be sure—unless you have the kind of information that I have never seen forthcoming, and it is very hard to get on a foreign-flag vessel—where every discharge pipe is going, and what is coming out of every aperture you are going to see in that boat.

This is one of the most vexing and difficult problems we have had.

This is why, in my judgment, the public is demanding this kind of regulation, but this is going to take some very, very careful working on and consideration before we can get something out that can work.

MR. POSTON: The Department of Agriculture is very much concerned with foreign vessels that come in here, with a view that they might carry some insects or plants which would bring disease into this country, and so they do look over these ships for this particular aspect of their cargo; but we have never been able to get any arrangements made, where the waste discharges of human wastes would receive any uniform controlled attention.

MR. GADLER: Well, in that respect, Mr. Badalich has pointed out that the Federal Government probably should step in on this point, and that is why I brought up the foreign vessels.

MR. STEIN: Yes. There is legislation, but I suspect that it deals with our international relations.

That legislation that is proposed before the Congress is going to be very carefully considered, and it is going to take a little time before you can do that with the implications that we have there now.

There is one other aspect on this. As you know, because of our wage requirements, sanitation and other requirements, we have a problem in getting vessels to fly the flag of the the American Merchant Marine. The question that naturally comes up is, if you put a restriction like this on, are you really going to get a flow of registries from the United States flag to foreign flags? Will you be accomplishing any real purpose by putting this in, except further depleting a marginal industry that is troubled, which we feel, for the wellbeing of the country, we have to have a considerable number of American-flag vessels?

MR. GADLER: Are you saying that we should give way to economic pollution?

MR. STEIN: No, I am not saying that at all.

What I am saying is that a device has to be sought that is going to achieve the purpose.

If this were a controlled device, for example, that could work, we might say, "Fine, let's go ahead," but if you are going to put this control on and the easy way out of it would be to transfer your vessel into one of these foreign registries, they could do the same thing by just changing a piece of paper; so it is not going to work.

We are still looking for a method where we can control these vessels in a system where this would work, and I think this is something we are all working on.

I think the public is demanding this so much that something is going to evolve on this within the next few years, but this is one of the trickiest areas of regulation that we have.

Just one point to give you the analogy: We have exacerbated to the nth degree the kind of problem that Mr. Badalich referred to in his statement. Here you have, theoretically anyway, a boat meeting all the requirements in Minnesota going into Wisconsin waters, being picked up or at least with an allegation of being picked up in Wisconsin and fined in Wisconsin. If you translate that to our situation with all the foreign nations, you can see the variants of the problem that arise.

This is why we really have to be very careful. The notion of the Federal Government taking over does not really answer the question, as long as we have the foreign-flag vessels. This is not solving the problem.

As yet, I am not sure that all hands are agreed that anyone has come up with a definitive solution.

MR. PACKARD: I would like to ask a question. With reference to the boating regulations between the two States, Wisconsin permits only the holding tanks, whereas we permit holding tanks as well as the macerator-chlorinator type of disposal?

MR. STEIN: That is correct.

MR. PACKARD: The problem seems to be the marina facilities for the disposal of the holding tanks. How has Wisconsin done this?

Of course. I realize you have many fewer lakes than we do. (Laughter)

MR. WISNIEWSKI: First of all, I should make it clear

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that the Wisconsin law is enforced by the Conservation Division, for which the State Board of Health writes the rules and regulations for design of holding tanks and on-shore disposal facilities.

The disposal facilities are not limited necessarily to holding tanks. The regulations do authorize the use of chemical toilets with resultant disposal on shore if the boater chooses to use that method, or that type of disposal, so that we are not strictly limiting it to the one method.

However, it is important to realize that the macerator-chlorinator unit is not recognized in Wisconsin, and, again with the four States on Lake Michigan, will not be included in the regulations concerning the disposal of wastes from small boats.

The limitations will be on holding tanks, or on devices that will destroy the wastes aboard for disposal on shore.

We in Wisconsin have gone through this over a period of years, and the macerator-chlorinator just is not acceptable to us. We do not believe that just because you add chlorine to solids, you can dump those solids in the lake. You have all the nutrients there. If you get 8,000 people on a lake, how are you going to say to the 8,000 people on the boats that you can dump your sewage into the lake, and yet you would take a village of 8,000 on shore and tell them you have got to remove everything before you put this sewage into the lake?

MR. PACKARD: I have one other question, as long as you made the last statement.

You speak of the nutrient removal. I do not want to be contentious about this. We don't accomplish the nutrient removal with municipal plants, as I understand it.

MR. WISNIEWSKI: But in municipal plants you do receive some nutrients. For example, in Milwaukee there is an activated sludge plant removing 80 to 85 percent of the phosphates by the inherent activated sludge process without any further additional treatment.

MR. PACKARD: Well, that is news to me. I was not aware of that. Thank you.

MR. STEIN: All right. I think we had better get off this subject. I do not want to belabor this, but let me say this:

We have many, many small lakes in the country. The House Government Operations Committee put out a report recently showing that these lakes were in pretty bad shape, and a lot of them were dying. The theory was to keep out the nutrients.

Regardless of what the cities do now, as I understand it, the theory of the four Lake Michigan States was that we are not going to allow nutrients from boats to get into Lake

Michigan.

Presumably, they have a program to do the same thing for cities and get the maximum amount of nutrient removal from a city effluent which will drain into a lake system. There I agree that not all the cities are doing what they could do, but at least the theory is that since we are striving for that, at least the four States have indicated that the macerator-chlorinator type of discharge will do violence to that theory.

As I have said, I don't know that we are going to resolve this with your States at this time. We would like to sit down and have the technical people from the States sit down with us and work this out. I think largely you are going to find that the technical judgments you are going to have to make are not that esoteric, aside from your philosophic determination, which, of course, you should consider if you want to go forward with this.

MR. PACKARD: I want to say I heartily endorse the principle of nutrient removal. I think it is very necessary.

MR. STEIN: Right.

MR. BADALICH: Mr. Chairman, getting back to one of your earlier questions here regarding Pages Nos. 10 and 11 with reference to the twenty sources, maybe we can make ourselves a little clearer here.

Actually, the nine that are listed do have positive commitments, due to the fact that they have already had plans approved, and they are under construction.

The other remaining eleven dischargers here have already retained consulting engineers to prepare preliminary plans.

According to the recommendation here on Page No. 12 of the Summary, we call for a submission of the preliminary plans as a first step, and they are doing something. The Sanitary District has retained a consultant now to go into a preliminary plan proposal for further treatment. The Honeymead Company has retained a consultant. Mankato has retained a consultant, but they have not submitted the preliminary plans in conformity with the schedule, and so we have listed them.

MR. STEIN: I recognize your statement. I have the Summary here and I think you have done a very good job, except possibly this is the one fly that I see in the ointment:

There were fifty-five sources. Out of these fifty-five sources, according to the report, thirty-five are in compliance, and that is very good. Nine are under way and have positive commitments, and that means preliminary plans. Eleven do not have these preliminary plans in yet.

According to the deadline we have here, they have to do it by June of this year.

Now we come to the little fly in the ointment that

I have, and this may be very natural. The difficulty is that this list of eleven is not a list of small or inconsequential dischargers. June of this year will tell the story of whether they are in compliance or not, and I think it is fair to say that if the eleven come in with their plans and can move off that list, we will be well on our way toward a clean-up; if they don't, considering the nature of those eleven, we are going to have a problem.

MR. BADALICH: All right.

Mr. Chairman, I would like to have Exhibits A, B, C, D and E, which are our regulations WPC 18, 19, 20, 21 and our Water Quality Sampling Program for Interstate Waters, submitted for the record.

MR. STEIN: Without objection, that will be included in the record as if read.

MR. BADALICH: Mr. Gadler brings up a question. These are not approved by the Agency as such. They are proposed effluent standards. We would like that submitted.

MR. STEIN: Yes. That will appear in the record.

MR. BADALICH: Thank you.

(The documents referred to are as follows:

APPENDIX A

STATE OF MINNESOTA

POLLUTION CONTROL AGENCY

CHAPTER EIGHTEEN: WPC 18

PROPOSED EFFLUENT STANDARDS FOR DISPOSAL SYSTEMS DISCHARGING TO THE MISSISSIPPI RIVER FROM THE OUTFALL OF THE MINNEAPOLIS-ST. PAUL SANITARY DISTRICT SEWAGE TREATMENT PLANT TO LOCK AND DAM NO. 2 NEAR HASTINGS

WPC 18. The effluent standards as hereinafter set forth are hereby adopted and established for that portion of the Mississippi River from immediately above the outfall of the Minneapolis-St. Paul Sanitary District sewage treatment plant in the City of St. Paul, approximately at the eastward extension of Baker Street East in said city, to the U. S. lock and dam No. 2 above Hastings.

(a) Definitions: The terms "person," "sewage," "industrial wastes," "other wastes," "treatment works," "disposal systems," and "waters of the state," as well as any other pertinent terms for which definitions are given in the water pollution control statutes, as used herein have the meanings ascribed to them in Minnesota Statutes, Section 115.01. Other terms and abbreviations used herein which are not specifically defined in the law shall be construed in conformance with the context, and in relation to the applicable section of the statutes pertaining to the matter at hand, and current professional usage.

(b) Effluent Standards: It is hereby established as a minimum requirement applicable to all persons responsible for disposal systems discharging sewage, industrial waste or other waste effluents to these waters, or which affect these waters, that secondary biological treatment and effective continuous chlorination, or the equivalent, shall be provided and/or the effluents treated before discharge so as to conform to the following:

Substance or Characteristic	Limiting Concentration
5-day biochemical oxygen demand	35 milligrams per liter
Total suspended solids	30 milligrams per liter
Total coliform group organisms	5,000 most probable number per 100 milliliters
Oil	10 milligrams per liter
Turbidity value	25

(c) Monthly Reports: All persons operating sewage, industrial waste or other waste disposal systems adjacent to or discharging to these waters shall submit regularly every month a report to the Agency on the operation of such disposal system, the effluent flow, and the characteristics of the effluents and receiving waters. Sufficient data on measurements, observations, sampling and analyses, and other pertinent information shall be furnished as may be required by the Agency to in its judgment adequately reflect the condition of the disposal system, the effluent and the waters receiving the effluent.

(d) Determination of Compliance: In making tests or analyses of the sewage, industrial wastes or other wastes to determine compliance with the standards, samples shall be collected in such manner and place, and of such type, number and frequency as may be considered satisfactory by the Agency from the viewpoint of adequately reflecting the composition of the effluents. No allowance will be made for dilution of the effluents in the waters of the state into which they are discharged. The samples shall be preserved and analyzed in accordance with procedures given in the 1965 edition of Standard Methods for the Examination of Water and Waste-Water, by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto, or other methods acceptable to the Agency.

(e) Variance: In any case where upon application of the responsible person or persons the Agency finds that by reason of exceptional circumstances the strict enforcement of any provision of these standards would cause undue hardship; that disposal of the sewage, industrial waste or other waste is necessary for the public health, safety or welfare; and that strict conformity with the standards would be unreasonable, impractical or not feasible under the circumstances; the Agency in its discretion may permit a variance therefrom upon such conditions as it may prescribe for prevention, control or abatement of pollution in harmony with the general purposes of applicable classifications and standards and the intent of state and national laws.

/s/ John P. Badalich

Dated: February 8, 1968

John P. Badalich, P.E.
Executive Secretary and Chief
Executive Officer
Minnesota Pollution Control Agency

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APPENDIX B

STATE OF MINNESOTA
POLLUTION CONTROL AGENCY
CHAPTER NINETEEN: WPC 19

PROPOSED EFFLUENT STANDARDS FOR DISPOSAL SYSTEMS DISCHARGING TO THE MINNESOTA RIVER FROM ABOVE CHASKA TO THE JUNCTION WITH THE MISSISSIPPI RIVER AT FORT SNELLING

WPC 19. The effluent standards as hereinafter set forth are hereby adopted and established for that portion of the Minnesota River from immediately above the Chaska Village south boundary to the junction with the Mississippi River at Fort Snelling.

(a) Definitions: The terms "person," "sewage," "industrial wastes," "other wastes," "treatment works," "disposal systems," and "waters of the state," as well as any other pertinent terms for which definitions are given in the water pollution control statutes, as used herein have the meanings ascribed to them in Minnesota Statutes, Section 115.01. Other terms and abbreviations used herein which are not specifically defined in the law shall be construed in conformance with the context, and in relation to the applicable section of the statutes pertaining to the matter at hand, and current professional usage.

(b) Effluent Standards: It is hereby established as a minimum requirement applicable to all persons responsible for disposal systems discharging sewage, industrial waste or other waste effluents to these waters, or which affect these waters, that secondary biological treatment and effective continuous chlorination, or the equivalent, shall be provided and/or the effluents treated before discharge so as to conform to the following:

Substance or Characteristic	Limiting Concentration
5-day biochemical oxygen demand	25 milligrams per liter
Total suspended solids	30 milligrams per liter
Total coliform group organisms	5,000 most probable number per 100 milliliters
Oil	10 milligrams per liter
Turbidity value	25

(c) Monthly Reports: All persons operating sewage, industrial waste or other waste disposal systems adjacent to or discharging to these waters shall submit regularly every month a report to the Agency on the operation of such disposal system, the effluent flow, and the characteristics of the effluents and receiving waters. Sufficient data on measurements, observations, sampling and analyses, and other pertinent information, shall be furnished as may be required by the Agency to in its judgment adequately reflect the condition of the disposal system, the effluent and the waters receiving the effluent.

(d) Determination of Compliance: In making tests or analyses of the sewage, industrial wastes or other wastes to determine compliance with the standards, samples shall be collected in such manner and place, and of such type, number and frequency as may be considered satisfactory by the Agency from the viewpoint of adequately reflecting the composition of the effluents. No allowance will be made for dilution of the effluents in the waters of the state into which they are discharged. The samples shall be preserved and analyzed in accordance with procedures given in the 1965 edition of Standard Methods for the Examination of Water and Waste-Water, by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto, or other methods acceptable to the Agency.

(e) Variance: In any case where upon application of the responsible person or persons the Agency finds that by reason of exceptional circumstances the strict enforcement of any provision of these standards would cause undue hardship; that disposal of the sewage, industrial waste or other waste is necessary for the public health, safety or welfare, and that strict conformity with the standards would be unreasonable, impractical or not feasible under the circumstances, the Agency in its discretion may permit a variance therefrom upon such conditions as it may prescribe for prevention, control or abatement of pollution in harmony with the general purposes of applicable classifications and standards and the intent of state and national laws.

/s/ John P. Badalich

J. P. Badalich

Dated: February 8, 1968 John P. Badalich, P.E.
Executive Secretary and Chief
Executive Officer
Minnesota Pollution Control Agency

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APPENDIX C

STATE OF MINNESOTA

POLLUTION CONTROL AGENCY

CHAPTER TWENTY: WPC 20

PROPOSED EFFLUENT STANDARDS FOR DISPOSAL SYSTEMS DISCHARGING TO THE MINNESOTA RIVER FROM THE BLUE EARTH RIVER TO CHASKA

WPC 20. The effluent standards as hereinafter set forth are hereby adopted and established for that portion of the Minnesota River from immediately above the mouth of the Blue Earth River in Mankato, to immediately above the Chaska Village south boundary.

(a) Definitions: The terms "person," "sewage," "industrial wastes," "other wastes," "treatment works," "disposal systems," and "waters of the state," as well as any other pertinent terms for which definitions are given in the water pollution control statutes, as used herein have the meanings ascribed to them in Minnesota Statutes, Section 115.01. Other terms and abbreviations used herein which are not specifically defined in the law shall be construed in conformance with the context, and in relation to the applicable section of the statutes pertaining to the matter at hand, and current professional usage.

(b) Effluent Standards: It is hereby established as a minimum requirement applicable to all persons responsible for disposal systems discharging sewage, industrial waste or other waste effluents to those waters, or which affect those waters, that secondary biological treatment and effective continuous chlorination, or the equivalent, shall be provided and/or the effluents treated before discharge so as to conform to the following:

Substance or Characteristic	Limiting Concentration
5-day biochemical oxygen demand	50 milligrams per liter
Total suspended solids	30 milligrams per liter
Total coliform group organisms	5,000 most probable number per 100 milliliters
Oil	10 milligrams per liter
Turbidity value	25

(c) Monthly Reports: All persons operating sewage, industrial waste or other waste disposal systems adjacent to or discharging to those waters shall submit regularly every month a report to the Agency on the operation of such disposal system, the effluent flow, and the characteristics of the effluents and receiving waters. Sufficient data on measurements, observations, sampling and analyses and other pertinent information shall be furnished as may be required by the Agency to in its judgment adequately reflect the condition of the disposal system, the effluent and the waters receiving the effluent.

(d) Determination of Compliance: In making tests or analyses of the sewage, industrial wastes or other wastes to determine compliance with the standards, samples shall be collected in such manner and place, and of such type, number and frequency as may be considered satisfactory by the Agency from the viewpoint of adequately reflecting the composition of the effluents. No allowance will be made for dilution of the effluents in the waters of the state into which they are discharged. The samples shall be preserved and analyzed in accordance with procedures given in the 1965 edition of Standard Methods for the Examination of Water and Waste-Water, by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto, or other methods acceptable to the Agency.

(e) Variance: In any case where upon application of the responsible person or persons the Agency finds that by reason of exceptional circumstances the strict enforcement of any provision of these standards would cause undue hardship, that disposal of the sewage, industrial waste or other waste is necessary for the public health, safety or welfare, and that strict conformity with the standards would be unreasonable, impractical or not feasible under the circumstances, the Agency in its discretion may permit a variance therefrom upon such conditions as it may prescribe for prevention, control or abatement of pollution in harmony with the general purposes of applicable classifications and standards and the intent of state and national laws.

/s/ John P. Badalich

Dated: February 8, 1968

John P. Badalich, P.E.
Executive Secretary and
Chief Executive Officer
Minnesota Pollution Control
Agency

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APPENDIX D

STATE OF MINNESOTA

POLLUTION CONTROL AGENCY

CHAPTER TWENTY-ONE: **WPC 21**

PROPOSED EFFLUENT STANDARDS FOR DISPOSAL SYSTEMS DISCHARGING TO THE MISSISSIPPI RIVER FROM THE JUNCTION OF THE RUM RIVER TO THE OUTFALL OF THE MINNEAPOLIS-ST. PAUL SANITARY DISTRICT SEWAGE TREATMENT PLANT, AND FROM LOCK AND DAM NO. 2 NEAR HASTINGS TO THE JUNCTION WITH THE CHIPPEWA RIVER, AND TO THE ST. CROIX RIVER FROM TAYLORS FALLS TO THE JUNCTION WITH THE MISSISSIPPI RIVER

WPC 21. The effluent standards as hereinafter set forth are hereby adopted and established for that portion of the Mississippi River from below the mouth of the Rum River in the City of Anoka, to immediately above the outfall of the Minneapolis-St. Paul Sanitary District sewage treatment plant in the City of St. Paul, and from the U. S. Lock and Dam No. 2 above Hastings to the mouth of the Chippewa River at the lower end of Lake Pepin near the Village of Wabasha, and that portion of the St. Croix River from the Nevers Dam in Taylors Falls, approximately at the eastward extension of the boundary between Sections 24 and 25, Shafer Township, Chisago County, to the junction with the Mississippi River near Hastings.

(a) Definitions: The terms "person," "sewage," "industrial wastes," "other wastes," "treatment works," "disposal systems," and "waters of the state," as well as any other pertinent terms for which definitions are given in the water pollution control statutes, as used herein have the meanings ascribed to them in Minnesota Statutes, Section 115.01. Other terms and abbreviations used herein which are not specifically defined in the law shall be construed in conformance with the context, and in relation to the applicable section of the statutes pertaining to the matter at hand, and current professional usage.

(b) Effluent Standards: It is hereby established as a minimum requirement applicable to all persons responsible for disposal systems discharging sewage, industrial waste or other waste effluents to these waters, or which affect these waters, that secondary biological treatment and effective continuous chlorination, or the equivalent, shall be provided and/or the effluents treated before discharge so as to conform to the following:

Substance or Characteristic	Limiting Concentration
5-day biochemical oxygen demand	50 milligrams per liter
Total suspended solids	30 milligrams per liter

J. P. Badalich

Total coliform group organisms	1,000 most probable number per 100 milliliters
Oil	Not to exceed a trace
Turbidity value	25

(c) Monthly Reports: All persons operating sewage, industrial waste or other waste disposal systems adjacent to or discharging to these waters shall submit regularly every month a report to the Agency on the operation of such disposal system, the effluent flow, and the characteristics of the effluents and receiving waters. Sufficient data on measurements, observations, sampling and analyses and other pertinent information shall be furnished as may be required by the Agency to in its judgment adequately reflect the condition of the disposal system, the effluent and the waters receiving the effluent.

(d) Determination of Compliance: In making tests or analyses of the sewage, industrial wastes or other wastes to determine compliance with the standards, samples shall be collected in such manner and place, and of such type, number and frequency as may be considered satisfactory by the Agency from the viewpoint of adequately reflecting the composition of the effluents. No allowance will be made for dilution of the effluents in the waters of the state into which they are discharged. The samples shall be preserved and analyzed in accordance with procedures given in the 1965 edition of Standard Methods for the Examination of Water and Waste-Water, by the American Public Health Association, American Water Works Association, and the Water Pollution Control Federation, and any revisions or amendments thereto, or other methods acceptable to the Agency.

(e) Variance: In any case where upon application of the responsible person or persons the Agency finds that by reason of exceptional circumstances the strict enforcement of any provision of these standards would cause undue hardship; that disposal of the sewage, industrial waste or other waste is necessary for the public health, safety or welfare, and that strict conformity with the standards would be unreasonable, impractical or not feasible under the circumstances, the Agency in its discretion may permit a variance therefrom upon such conditions as it may prescribe for prevention, control or abatement of pollution in harmony with the general purposes of applicable classifications and standards and the intent of state and national laws.

/s/ John P. Badalich

Dated: February 8, 1968

John P. Badalich, P.E.
Executive Secretary and
Chief Executive Officer
Minnesota Pollution Control
Agency

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APPENDIX E

STATE OF MINNESOTA

WATER POLLUTION CONTROL COMMISSION

WATER QUALITY SAMPLING PROGRAM FOR INTERSTATE WATERS

June 1967

The state water quality sampling program has been in being since 1953 with periodic adjustments in sampling stations and analyses to adequately monitor many of the significant waters of the state. The data complied have been published in four volumes to date with the fifth volume being nearly ready for publication. Volume four is included as an attachment.

In order to support the standards for the interstate waters of Minnesota and to assure that compliance with the standards is being maintained, the program will be significantly expanded and revised.

Attached is a tabulation of the 86 surface water quality monitoring stations proposed with the names of the waters involved, the station designation, and the location of the station. The stations are also designated on the attached map of the interstate waters.

It will be noted that 71 of the stations are on interstate waters and that 15 are on intrastate waters which are tributary to interstate waters. The intrastate waters stations are included because it is felt that there is a reasonable probability that the quality of the interstate waters could be affected by tributary discharges.

It is envisioned that samples will be taken manually at bi-monthly intervals at each station listed with analyses to be performed as shown on the list following the listing of the stations. Routine analyses will be done bi-monthly and in addition special analyses will be done at least once per year on each station where applicable at least until it can be determined that particular analyses are not required because of lack of significance. However, the extent of both sampling and analysis will be governed by the availability of resources to the agency.

The samples will be preserved and analyzed in accordance with the techniques given in the current edition of Standard Methods for the Examination of Water and Waste Water by the APHA, AWWA, and WPCF and any amendments or revisions thereto or other methods acceptable to the Commission.

WATER QUALITY SAMPLING STATIONS

RED RIVER BASIN

River	Station #	Location of Sampling Point
Bois de Sioux River	B.S.-0.1	Bridge on SH 210, in Breckenridge
Red River of the North	Re-459	Water Works intake in Moorhead at Elm Street and 14th Avenue S.
Red River of the North	Re-403	Bridge on CSAH 39, at Perley
*Red River of the North	Re-296	Water Works Intake in Grand Forks, N.D. (Located on Alemonte Avenue S.)
Red River of the North	Re-274	Bridge on SH 1, at Oslo, Minnesota
Ottertail River	OT-67	Bridge on CSAH 1, 4 miles east of Fergus Falls
Ottertail River	OT-49	Bridge on CSAH 15, 2.5 miles west of Fergus Falls
Ottertail River	OT-1	Bridge on 4th Street N. and Andrews Avenue, in Breckenridge
Red Lake River	RL-0.2	Bridge on SH 220, in East Grand Forks, Minnesota

RED RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
Roseau River	Ros-121	Bridge on CSAH 2, at Malung, Roseau County
Roseau River	Ros-55	Bridge on CR 53, at Caribou, Kittson County

* Federal Water Pollution Surveillance Station

LAKE OF THE WOODS BASIN

*Rainy River	Ra-83.5	International toll bridge, at International Falls
Rainy River	Ra-75.0	Boat Sample, 4-1/2 miles east of Pelland, Minnesota
*Rainy River	Ra-12.1	International Bridge, at Baudette
Lake of the Woods	L-O-W	Boat Sample at Arnesen, on Lake of Woods 1/2 mile from shore
Crane Lake	Cr-L	Boat Sample, at outlet of Crane Lake
Saganaga Lake	Sa-L	Boat Sample, on Saganaga Lake
Shagawa River	Sh-2	Bridge on CSAH 88, 1 mile north of SH169 at Ely

*Federal Water Pollution Surveillance Station

LAKE OF THE WOODS BASIN

(Continued)

River	Station #	Location of Sampling Point
Kawishiwi River (South Br.)	Ka-10	Bridge on SH1, Birch Lake outlet, above dam
Kawishiwi River	Ka-0.1	Bridge on CSAH 18, Garden Lake Outlet, above dam

LAKE SUPERIOR BASIN

River	Station #	Location of Sampling Point
Lake Superior	LS-1	Grand Marais water plant intake
Lake Superior	LS-2	Silver Bay water plant intake
Lake Superior	LS-3	Duluth water plant intake
St. Louis River	SL-120	Bridge on CSAH 7, near Forbes
St. Louis River	SL-51.9	Bridge on USH 2 , at Brookston
St. Louis River	SL-19.1	Bridge on SH 23, at Fond du Lac
N. Fork Nemadji River	Ne-8	Bridge on SH 23, 1 mile south of CSAH 1

MINNESOTA RIVER BASIN

River	Station #	Location of Sampling Point
Big Stone Lake	BSL	Bridge on CSAH 30 at Ortonville

MINNESOTA RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
Yellow Bank River (North Fork)	YB-10	Bridge on CSAH 7, 2-1/2 miles north of Rosen
Minnesota River	Mi-200	Bridge on SH40, at Milan
Lac Qui Parle	LQP-38	Bridge on SH 68, near Canby
Lac Qui Parle	LQP-0.5	Bridge on CSAH 33, near Lac Qui Parle
Yellow Medicine (North Fork)	YM-44	Bridge on SH 68 at Porter
Yellow Medicine	YM-0.5	Bridge on SH 67, at mouth of River
Minnesota River	Mi-132	Bridge on SH 19 and USH 71 at Morton
Cottonwood River	Co-0.5	Bridge SH 15 at New Ulm
Minnesota River	Mi-129	Bridge on CSAH 24, at Courtland
Blue Earth River	BE-100	Bridge on CSAH 4, South of Blue Earth
Blue Earth River	BE-63	Bridge on SAR 14, 1/2 mile west of Winnebago
Blue Earth River	BE-0	At mouth, junction with Minnesota River at Mankato

MINNESOTA RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
East Fork Blue Earth River	EBE-18	Bridge on SH 253 2 miles north of Bricelyn
Minnesota River	MI.-70	Bridge on SH 19, at Henderson
Minnesota River	Mi.-25.1	Bridge on USH 169, at Shakopee
Center Creek	CeC-16	Bridge on SH 15, at Farimont

MISSISSIPPI RIVER BASIN

Mississippi River	UM-1365	Bridge on SH 31, 1/2 mile west of Lake Itasca
Mississippi River	UM-1292	Bridge on CSAH 8, east of Bemidji
Mississippi River	UM-1186	Bridge on SH 6, Southwest of Cohasset
Mississippi River	UM-1137	Bridge on SH 34, at Jacobson
Mississippi River	UM-1029	Bridge on SH 6, north of Crosby
Mississippi River	UM-982	Bridge on SH 115 at Camp Ripley Jct.
Mississippi River	UM-953	Bridge on CSAH 26 west of Royalton
Mississippi River	UM-929	St. Cloud Water Works Intake

MISSISSIPPI RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
Mississippi River	UM-914	Bridge on SH 24, at Clearwater
Crow River	Cr-0.2	Bridge on SH 101, at Dayton
Rum River	Ru-0.6	Bridge on USH 10 at Anoka
Rice Creek	Ri-1	Bridge on SH 47 (University Avenue) in Fridley
Rice Creek	Ri-16	Bridge on USH 8 Southwest of Forest Lake (Sec. 23, T32N, R22W, Anoka Co.)
Mississippi River	UM-859	Minneapolis water works intake
Mississippi River	UM-841	CRI&P Railroad Bridge off CSAH 38 in St. Paul Park
Mississippi River	UM-815	Lock and Dam #2 at Hastings
*Mississippi River	UM-797	Lock and Dam #3 at Red Wing
Mississippi River	UM-760.2	Bridge on SH 60, at Wabasha
Mississippi River	UM-714.3	Lock and Dam #6 near La Moille
Root River	R-1.0	Bridge on SH 26, 1 mile south of USH 16, 3 miles east of Hokah
Crooked Creek	Cro-0.5	Bridge on SH 249, West of Reno
Riceford Creek	Ric-24	Bridge on CSAH 4 at Yucatan

ST. CROIX RIVER BASIN

River	Station #	Location of Sampling Point
St. Croix River	SC-111	Bridge on SH 48, 2 miles west of Danbury, Wisconsin
St. Croix River	SC-80	Bridge on SH 70, 9 miles east of USH 61 and Pine City
St. Croix River	SC-17.3	C&NW Railway bridge, 2 miles south of Bayport
Kettle River	Ke-11	Bridge on SH 48, east of Hinckley
Snake River	SN-0	At mouth, off CR 18, Sec. 2, T38N, R19W, Pine County
Rush Creek	Ru-0.5	Bridge on CR 56, Sec. 6, T36N, R19W, Chisago County
Sunrise River	Su-2	Bridge on CSAH 9 at Sunrise
Sunrise River	Su-16	Bridge on CSAH 19 at Stacy

MISSOURI RIVER

Rock River	RO-24	Bridge on CSAH 7, 2 miles east of Hardwick
Rock River	RO-0	Bridge on State Line Road, on South Sec. Line of Sec. 36, T101n, R45W, 1 mile east of USH 75

MISSOURI RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
Pipestone Creek	P.C.-1.5	Bridge on CR 55, T106N, R47W, S13-18, Southwest of Pipestone

CEDAR RIVER BASIN

River	Station #	Location of Sampling Point
Red Cedar River	R. Ce-27	Bridge on CSAH 2, 1-1/2 miles east of USH 218 at Lansing
Red Cedar River	R. Ce-12	Bridge on CSAH 4, 2 miles west of USH 218, 4 miles south of Austin
Red Cedar River	R. Ce-0	Bridge on State Line Road on South Sec. line at Sec. 33, T101N, R18W, 3 miles west of USH 218 and Lyle
Deer Creek	D.C.-0	Bridge on State Line Road on South Sec. Line of Sec. 32, T101N, R19W, 6 miles east of USH 65 at Deer Creek
Shell Rock River	S. R.-1.5	Bridge on CSAH 1, 1 mile west of USH 65 and Gordonsville

CEDAR RIVER BASIN

(Continued)

River	Station #	Location of Sampling Point
Fountain Lake	Fou. L	Bridge on USH 16 in Albert Lea

DES MOINES RIVER BASIN

River	Station #	Location of Sampling Point
West Fork Des Moines R.	WDM-3	Bridge on CSAH 23, south of Petersburg
West Fork Des Moines R.	WEM-54	Bridge on CSAH 42, 5-1/2 miles south of Dovray
East Fork Des Moines R.	EDM-6	Bridge on SH 263, 7-1/2 miles south of USH 16, and 2 miles north of Ceylon

Bi-monthly Analyses	Annual Analyses
Temperature	Arsenic
Total Coliforms (confirmed)	Barium
Fecal Coliforms	Bicarbonates
Total Solids	Boron
Total Volatile Matter	Calcium
Suspended Solids	Hexavalent Chromium

Bi-monthly Analyses

Suspended Volatile Matter
Turbidity
Color
Total Hardness
Alkalinity
pH
Chlorides
Dissolved Oxygen
5-Day Biochemical Oxygen Demand
Phosphorus
Ammonia
Organic Nitrogen
Nitrites
Nitrates
Methylene Blue Active Substance
Copper
Cadmium
Nickel
Zinc
Specific Conductance

Annual Analyses

Total Chromium
Cyanides
Fluorides
Lead
Magnesium
Oil
Selenium
Silver
Silicate
Sodium
Sulfates
Sulfides
Threshold Odor
Phenol
Potassium
Iron
Manganese
Fecal Steptococcus
Radioactivity
Pesticides
Plankton)

* * *

MR. BADALICH: Mr. Chairman, do you want me to continue?

MR. POSTON: I have one more question.

MR. STEIN: Mr. Poston.

MR. POSTON: I might comment that with reference to the S. B. Foot Tanning Company report that you submitted here, that they have joined with the City of Red Wing in an application for a Federal Research and Development Grant. I think research has been done with the type of treatment that they are proposing, and I do not want to put our headquarters on the spot, but we feel that this would be a worth while project to demonstrate a new method based upon research that has been carried out, and try this out on plant scale size. I am hopeful that we will have a grant to make this project possible.

I am appreciative of your report. It is very complete and I have difficulty digesting it all, but I will look further at it and I may have some further questions.

MR. BADALICH: Thank you.

MR. STEIN: Thank you.

I would like again to commend Minnesota and the new Agency both on the reporting and the progress, because I do think that since the last conference, particularly with Minnesota having most of the major discharges and having a new agency at the time, they have done an excellent job.

For a progress meeting we can say now that this looks very, very good.

MR. BADALICH: Thank you, Mr. Chairman.

Mr. Chairman, if I may continue, I do have some letters from some people who could not make an appearance this morning.

First I should call on the City of Minneapolis. I do have a letter here from the Director of Public Works, Clayton A. Sorenson.

I wonder if there is anybody from Minneapolis who would like to read this letter?

(No response.)

MR. BADALICH: If not, Mr. Chairman, I will read it into the record.

"CITY OF MINNEAPOLIS

DEPARTMENT OF PUBLIC WORKS
Minneapolis, Minn. 55415

April 23, 1968

"Federal Water Pollution Control Administration
U. S. Department of the Interior
Leamington Hotel
Minneapolis, Minnesota 55404

Attention: Conferees

"Gentlemen:

"Re: Progress Evaluation Meeting on Pollution of the Interstate Waters of the Upper Mississippi River and Tributaries

"The City of Minneapolis received a written notice on August 28, 1967, from the Minnesota Pollution Control Administration requesting schedules and a remedial program for pollution control of the Mississippi River in the city.

"This notice outlined the obligations of the City of Minneapolis and recommended corrective measures as established by the Federal-State Conference on Pollution of the Upper Mississippi River which was held in Minneapolis in February and March 1967.

"The City of Minneapolis notified the Minnesota Pollution Control Administration on December 21, 1967, of their proposed programs and intentions to comply.

"A copy of the letter is attached for your information.

"Very truly yours,

/s/ Clayton A. Sorenson
Director of Public Works"

J. P. Badalich

The letter referred to, Mr. Chairman, is about a page and a half long. Do you want it read?

MR. STEIN: You can either submit it for the record or read it. You can submit it for the record as if read. Would you prefer to do that?

MR. BADALICH: Yes, I would.

MR. STEIN: This letter will be accepted for the record as if read.

"CITY OF MINNEAPOLIS
DEPARTMENT OF PUBLIC WORKS
THOMAS A. THOMPSON, DIRECTOR
MINNEAPOLIS, MINN. 55415
C. A. Sorenson, Deputy Director
T. B. Corlett, Director, Water Works
W. G. Ridge, Director, Operations
E. A. Babcock, Director General Services
M. E. Enquist, Director, Engr. Design
R. H. Sprungman, Director, Traffic Engr.

"December 21, 1967

"Minnesota Pollution Control Administration
459 Board of Health Building
University Campus
Minneapolis, Minnesota 55440

"Attention: Mr. John Badalich, Director

J. P. Badalich

"Gentlemen:

"The City of Minneapolis has reviewed the letter dated August 28, 1967, of the Minnesota Pollution Control Administration setting forth the obligations of the city and recommended measures for compliance.

"It should be pointed out that the Federal Water Pollution Control Administration report gives the impression that the City of Minneapolis has had no active program for the abatement of pollution. The fact is that the City has made real and significant progress towards the accomplishment of a pollution control program on the Mississippi River which is compatible with the recommendations of the Federal Water Pollution Control Administration report.

"The City of Minneapolis has not built any combined sewers since about 1938 and, in fact, has spent, either independently or in combination with other agencies, nearly $30 million in separating combined sewers within the City. Most of this work has been accomplished in the past eight years. The City has been proceeding on its own initiative - without waiting for threats of action by the State Water Pollution Control Commission and without assurance of any financial assistance through Federal Grants.

J. P. Badalich

"At the present time, the City has a tentative 10-year storm sewer separation program estimated to cost $30,000,000. The 5-year (1968-1972) bond program for the separation program provides for nearly complete separation in the upper river above St. Anthony Falls at a cost of approximately $15 million. Council Action on November 14, 1967, provided for expenditures of $3,305,000 for the 1968 storm sewer separation program.

"We have estimated that the City is now approximately 65% separated, with the remaining 35% scheduled in the next 10 years. The Regulator Demonstration program currently underway will assist in preventing sanitary overflows into the Mississippi River as an interim solution until final separation is completed. Our accomplishments to date and plans for the future are undoubtedly the envy of any large older city in the nation today.

"The Minneapolis Water Department has reviewed the pollution problems as outlined in the report and has proposed a program to the Council to construct and operate waste disposal systems which will eliminate and filter backwash into the river without prior treatment. This program will also provide for chemical recovery processes and equipment to eliminate chemical pollutants "from entering the river. Favorable action and provision for funds were taken on December 20, 1967, by the City Council.

"We have reviewed the obligations of the City and recommended measures for compliance as set forth in your letter of August 28, 1967, and find no objections to them and intend to comply within the specified time.

"Yours very truly

/s/ T. A. Thompson

Director of Public Works

TAT/lfi

Encs. Water Dept. - Preliminary Report

Sewer Dept. - 5-Year Separation Program, misc. maps, etc.

cc: Honorable Arthur Naftalin, Mayor

Mr. Dan Cohen, President - City Council

Mr. Keith Stidd, City Attorney."

MR. STEIN: All right.

MR. BADALICH: I do have another letter, Mr. Chairman, from the City of St. Paul, addressed to myself:

"In response to your April 10th information" --

MR. STEIN: Pardon me. In reading those letters, could you give the date?

MR. BADALICH: This letter is dated April 19, 1968. It is addressed to myself.

"In response to your April 10th information release about the April 30th pollution control meeting at the Lemington Hotel, please be advised that Saint Paul will have a short written statement to present.

"Yours very truly,
/s/ Eugene V. Avery
Chief Engineer."

I believe Mr. Avery is in the audience.

Mr. Avery, do you want to make a statement?

MR. AVERY: Yes.

STATEMENT OF EUGENE V. AVERY, CHIEF ENGINEER, DEPARTMENT OF PUBLIC WORKS, CITY OF ST. PAUL, MINNESOTA

MR. AVERY: Mr. Chairman, Conferees and attendants at the conference:

I am Eugene V. Avery, Chief Engineer in the Department of Public Works in Saint Paul. On behalf of the Mayor and City Council, I am here to present, very briefly, Saint Paul's progress in water pollution control as it affects the Mississippi River passing through our city.

E. V. Avery

Let me say initially that Saint Paul is in favor of clean rivers and pollution abatement. This position is historical and is not brought about solely by the current directives and pressures from State and Federal regulatory agencies. We have, both in past decades and in current programs, demonstrated with expenditure of many millions of dollars that we are concerned that sewage be adequately treated. In addition to our participation in treatment plant activities, through the Minneapolis-Saint Paul Sanitary District, we have been extensively rebuilding our city sewers also with the objective of steady reduction in the amount of diluted sewage overflow from this combined system. Even though only three or four percent of the sewage overflows to the river, this is nevertheless a serious problem and we are working steadily to solve it.

For example, the city in recent years has spent over $10 million on storm sewer outfall construction. These are major trunks outletting to the river and capable of carrying the stormwater from approximately six thousand acres, about 30 percent of the present combined sewer area within the city limits. They are designed in addition to serve some 1,600 acres of nearby suburban areas. We have encouraged and cooperated in the Minneapolis-Saint Paul Sanitary District regulator demonstration program, which we expect to produce results widely useable in our contemplated sewer regulator betterments.

In the downtown area, as part of the Capital Center Development, in the Riverview industrial areas, in the southeast part of the city and in the vicinity of Lakes Phalen and Como, separate sewer systems have been constructed. Separation of sewers in industrial or commercial areas, has cost in some cases as much as $100,000.00 per block.

In order to provide comprehensive guide lines for the selection of project priorities, the city in 1965 and 1966, undertook to prepare a list of the most needed projects, having as an objective the elimination of sewage back-up into basements and a significant reduction in the frequency and amount of sewer system overflow to the river. Out of that study developed the January 1967 report entitled, "St. Paul Sewerage and Drainage." This report recommended accomplishment as soon as possible of 120 specific projects having a total estimated cost in January 1967 of $42.7 million. The list is serving as the basis for our current sewer facility construction program and we are undertaking these projects as rapidly as possible. Approximately 50 percent of the city's currently authorized capital improvement funds for all purposes are being used for sewers. During 1968, sewer construction costs will amount to some $6 million in Saint Paul. The extent of construction will be the most that the city has seen in any one year for many decades. This 1968 construction program will contribute to the separation and pollution abatement objective all over the city and will substantially complete the separation on the so-called West Side, a completely developed residential, industrial and commercial area of about 1,800 acres.

Although our efforts have been substantial, it seems apparent that our activities, as well as those of others, must be considerably increased if we are to bring about and preserve the high quality of urban environment which we all acknowledge to be desirable. With this in mind, we are seeking ways and means to speed up our current $43 million program and to prepare plans for projects and facilities extending considerably beyond this current program.

Last year, about September 1st, we received from the Minnesota Pollution Control Agency, a directive setting forth certain sewer system effluent standards and requiring by March 17, 1969, a detailed engineering report on eliminating the existing combined sewers and/or developing alternative methods for controlling the discharge of sewage to the Mississippi River. The directive stated further that we are to construct such facilities as may be needed so as to be in compliance with the standards by not later than June 17, 1977.

Cost of the engineering study is expected to be several hundred thousand dollars. Since the Minnesota Pollution Control Agency directive was received too late for us to make proper financing provisions in the 1968 budget, we have had some difficulty and delay in arranging for planning funds; but this has now been done.

After interviewing principals from engineering firms on a nationwide basis, we have selected the firm of Horner & Shifrin, Inc., St. Louis, to perform the main body of the study. I have attached to my statement a copy of our contract with this company in order to complete the records of the conference.

We are in the process also of developing a contract with the firm of Greeley & Hansen, Chicago, for certain phases of the work. The Horner & Shifrin people will be developing plans and estimates for the physical facilities required to meet the standards. Greeley & Hansen will perform a study of the administrative, operational and financial aspects of the water pollution control activities, relating both to our existing as well as our future sewerage systems.

Initial financial encumbrances are $173,000.00 for the Horner & Shifrin contract and $40,000.00 for the Greeley & Hansen contract. We expect that this initial encumbrance of $213,000.00 may well be considerably increased before the work is completed. The work of the two firms together will constitute the planning response to the State Agency's directive, but we expect within the next six weeks to have this contract executed.

E. V. Avery

We expect to have this planning report completed in the fall of 1969, slightly more than two years after receipt of the Pollution Control Agency's directive. We believe that this will be in substantial compliance with the intent of the Federal-State Conference held in February and March of 1967, even though it will undoubtedly be necessary for us to request a time extension of several months beyond March 17, 1969, the date specified in the State Agency's directive.

As one part of our study we do plan to investigate and to estimate construction costs, more precisely than heretofore, for a complete sewer separation program. Because we believe the general cost magnitude for complete separation to be beyond Saint Paul's probable financing ability, we plan to concentrate on alternate methods of pollution control, such as riverside treatment of combined sewage and stormwater overflow. We will undoubtedly propose certain "express" sewers to remove major suburban sanitary flows and large industrial flows from our combined system. Our regulator monitoring and betterment investigations will probably be phased as the latter part of our study, so we can take maximum advantage of the Federally-assisted Minneapolis-Saint Paul Sanitary District investigations and also those of other groups around the country.

Our plan, to be presented in the fall of 1969, though it will involve a substantial degree of sewer separation, will rely heavily on alternate methods of pollution control, not only for financial reasons, but also because separation, in our view, will probably not meet the proposed water quality standards. The proposed standards are for swimming quality water in both the river and in sewer system effluents. Our understanding is that even stormwater will not meet that standard. Therefore, even if the plan were to involve complete separation of sewers, it may be necessary to include some treatment of stormwater We do not wish to draw firm conclusions before our study is completed, but we are, of course, extremely apprehensive about the financial impact of any plan, whatever its character, that has as its objective the achievement of a sewer system effluent that is of swimming quality, whether it be a combined sewer overflow or stormwater overflow.

More precise determination of the financial impact must, of course, await completion of the plan. However, at this point we do know enough about our sewer system, about the facilities that may be required and about general cost figures to realize that the program necessary to meet the standards might very well be such as to represent the equivalent of a 60 percent increase in the city property tax levy. This would be the equivalent of an increase of about 25 percent in the overall tax statement for each Saint Paulite. Financing requirements of this magnitude would be a major problem to Saint Paul, especially when available resources are considered in relation to overall community needs, which include not only sewer systems but such community necessities as adequate schools, streets, fire protection, police protection and recreation.

The water quality and effluent standards are very high, but we think they do represent a desirable objective. We do not oppose these standards, but we are concerned about our financial ability to meet them. When our plans and cost estimates are completed in 1969, we will have more precise figures. At that time, in considering implementation schedules, together with ways and means of financing the facilities, we hope and trust that State and Federal enforcement agencies will assist us with as much financial aid as possible.

Approved by Saint Paul City Council April 30, 1968.

(The agreement attached is as follows:

AGREEMENT FOR PROFESSIONAL ENGINEERING SERVICES

BETWEEN THE

CITY OF SAINT PAUL

AND

HORNER & SHIFRIN, INC.

CONSULTING ENGINEERS

This Agreement, made this 29th day of April, 1968, by and between the City of Saint Paul, a municipal corporation of the State of Minnesota, acting in the premises by and through its Commissioner of Public Works and other proper officers, under the authority of a resolution of its Council, C. F. No. 238140, approved April 17, 1968, hereinafter referred to as "City" and Horner & Shifrin, Inc., hereinafter referred to as "Consultant."

WITNESSETH:

WHEREAS, the City desires to conduct an intensive investigation of its sewer system to determine needed works to comply with the Minnesota Pollution Control Agency directive contained in letter to Mayor Byrne, dated August 28, 1967, and

WHEREAS, the City does not have adequate engineering staff to perform said detailed engineering studies, investigations, analyses, and reports, and

NOW, THEREFORE, the City and the Consultant, for the consideration hereinafter named, do hereby mutually agree as follows:

I. GENERAL CONDITIONS

A. COMPLETION DATES:

Starting times and completion times for the various phases of the project are specified in Section V, TIME SCHEDULE.

B. TERMINATION:

This Agreement may be terminated by the City for any reason whatsoever, at any time upon written notice to the Consultant. The original copies of all drawings, prints, plans, field notes and other written information prepared by the

Consultant prior to said termination shall become the property of the City. Such termination shall not affect any legal right of the City against the Consultant for any breach of this Agreement.

C. QUALIFICATIONS OF PROJECT ENGINEER:

For the purpose of dealing with the City, the Consultant shall assign as project engineer, subject to the approval of the City, a Registered Civil Engineer, registered in Minnesota, having proven experience in municipal engineering who will act as the single contact with the City in the conduct of reviews. Said project engineer shall be in full charge and responsible for the conduct of the Consultant's responsibility as well as affording liaison. The Consultant may replace said project engineer, subject to the approval of the City. The consultant shall replace the project engineer when requested by the City. The Consultant shall furnish resumes and other information as necessary to permit a proper review of the qualifications of the project engineer.

D. DISPOSITION OF PLANS AND COMPUTATIONS:

All plans, survey notes and copies of design computations shall become the property of the City. The City shall have the right to use any or all of said plans or designs for any public purpose.

E. CLAIMS, INDEMNITY AND INSURANCE:

1. Claims

The Consultant shall indemnify and save harmless the City and all of its officers, agents and employees from all suits, actions or claims of any character brought for or on account of any injuries or damages received by any person or property resulting from an error, omission or negligent act of the Consultant or any persons employed by him, in carrying out the terms of this Agreement.

2. Independent Contractor

For the purposes of this Agreement, the Consultant shall be deemed to be an independent contractor and not an employee of the City. Any and all employees of the Consultant or other persons while engaged in the performance of any work or services required by the Consultant under this Agreement shall not be considered employees of the City and any and all claims that may or might arise under the Workmen's Compensation Act of Minnesota on behalf of said employees or other persons while so engaged, and any and all claims made by any third party as a consequence of any act or omission on the part of the Consultant's employees or other persons while so engaged on any of the work or services to be rendered shall in no way be the obligation or responsibility of the City. The Consultant shall pay as they become due, all just claims for work, tools, machinery, skills, materials insurance premiums, equipment and supplies furnished, rendered or performed in the execution of this Agreement.

3. Insurance

The Consultant shall carry an Architects and/or Engineers' Professional Liability Insurance Policy in the amount of at least $250,000.00, and shall provide a copy of such Professional Liability Insurance Policy to the City, which Policy shall be subject to approval as to form by the City. In addition to the standard coverage for errors and omissions, the Policy shall include coverage for contractual liability (hold harmless coverage). The Policy shall provide that the City shall receive thirty days' written notice of cancellation thereof or notice of any material changes in said Policy.

The Consultant shall secure and maintain such insurance as will protect him from claims for bodily injury, death, or property damage which may arise from the performance of his services under this Agreement.

F. COMPLIANCE WITH LAWS:

The Consultant shall comply with all Federal, State and local laws together with all ordinances and regulations applicable to the work. He shall procure all licenses, permits, or other rights necessary for the fulfillment of his obligations under this Agreement.

Before final payment can be made for the work on this project, the Consultant must make a satisfactory showing that he has complied with the provisions of Laws of Minnesota, 1961, Chapter 213, Article I, Section 6, as the same may be hereafter codified, requiring the withholding of State Income Tax for wages paid employees on this project. The required affidavit forms may be obtained from the Commissioner of Taxation, Centennial Building, St. Paul, Minnesota 55101.

The Consultant shall be deemed a contractor for the application of all provisions hereto and laws against unlawful discrimination on account of race, creed or color hereunder. The Consultant agrees, in accordance with Chapter 238, Laws of the State of Minnesota for 1941, that in the hiring of common or skilled labor for the performance of any work under this Agreement, he shall not, by reason of race, creed or color, discriminate against any person who is a citizen of the United States who is qualified and available to perform the work to which such employment relates; that no contractor, material supplier or vendor under this Agreement shall in any manner discriminate against, or intimidate, or prevent the employment of any person, or on being hired, prevent or conspire to prevent any person from the performance of work under this Agreement on account of race, creed or color; that this Agreement may be cancelled or terminated by the City and all money due or to become due hereunder shall be forfeited for a second or any subsequent violation of the terms or conditions of this Agreement.

G. CONTINGENT FEE:

The Consultant warrants that he has not employed or retained any company or person, other than a bona fide employee working solely for the Consultant, to solicit or secure this Agreement, and that he has not paid or agreed to pay any company or person, other than a bona fide employee working solely for the Consultant, any fees commission, percentage, brokerage fee, gifts, or any other consideration, contingent upon or resulting from the award or making of this Agreement. For breach or violation of this warranty, the City shall have the right to annul this contract without liability, or in its discretion to deduct from the contract price or consideration, or otherwise recover, the full amount of such fee, commission, percentage, brokerage fee, gift or contingent fee.

H. CITY EMPLOYEES:

The Consultant shall not engage on a full or part-time or other basis during the period of the contract any professional or technical personnel who are, or have been at any time during the period of the contract, in the employ of the City, except regularly retired employees, without the written consent of the public employer of such person.

I. SUBLETTING:

The services of the Consultant to be performed hereunder are personal and shall not be assigned, sublet or transferred unless written authority to do so is granted by the City.

J. SUCCESSORS AND ASSIGNS:

The City and the Consultant each binds himself, his partners, successors, executors, administrators and assigns to the other party of this Agreement and to the partners, successors, executors, administrators and assigns of such other party, in respect to all covenants of this Agreement; except as above, the Consultant shall not assign, sublet, or transfer his interest in this Agreement without the written consent of the City. Nothing herein shall be construed as creating any personal liability on the part of any officer or agent of any public body which may be a party hereto.

K. CITY INSPECTION:

Duly authorized representatives of the City shall have the right to inspect the work of the Consultant whenever they deem it necessary.

II. SCOPE OF SERVICES

A. GENERAL RESPONSIBILITY:

The Consultant shall:

1. Have complete responsibility for doing all investigations, monitoring, sampling, studies, analyses, etc., necessary for the preparation of preliminary plans for controlling sanitary sewage discharge to the Mississippi River, by separation

of the combined sewer system or by other approved alternate methods.

2. Serve as the City's professional representative in all phases of the study and project report and give consultation and advice to the City during the performance of his services.

3. Coordinate this study as necessary with that of other consultants.

B. STUDY PHASES:

The report shall be conducted in two phases.

1. Phase I -

a. A general appraisal of the alternatives that are available and the preparation of a program of investigations necessary to complete the study required by the Minnesota Pollution Control Agency (MPCA). This phase shall include, but not be limited to:

(1) Reviewing previous studies, reports, and pertinent data relative to estimating wastewater system needs for the City.

(2) Making cursory general investigations of existing wastewater facilities to determine their condition and capacity to meet present and future requirements.

(3) Making recommendations to the City as to the effects of State standards proposed for Federal approval for sewer effluents discharging into that reach of the Mississippi River through St. Paul. Such recommendations to be based on studies of other water courses throughout the nation as well as the Mississippi River and its tributaries.

(4) Determining ways to conduct direct to sanitary interceptors via express sewers sanitary wastes from suburbs and the Minnesota Mining & Manufacturing Co. Conway Street connection.

b. The objectives of the Phase I study are as follows:

(1) To identify and appraise, very generally, the conceptual alternatives for achieving the equivalent of combined sewer separation for the area served by the City combined sewer system to meet the MPCA requirements.

The alternate plans investigated shall include, but shall not necessarily be limited to:

(a) Separation of combined storm and sanitary flows by the construction of new storm and sanitary sewers where feasible.

(b) Separation of storm flow from combined sewers, the diversion of such flows to new storm sewers and conveyance directly to the Mississippi River.

(c) Proposal of designs for reliable and functional regulator systems through which the City in connection with the proposed monitoring system may exercise positive control of overflows. In this connection review the Minneapolis-St. Paul Sanitary District (MSSD) system of monitoring overflows at major regulators and make recommendations, where appropriate, to adopt or modify the MSSD system for use at those combined sewer overflows in the St. Paul system not presently supplied with monitoring devices.

(d) Separation of storm flow from combined sewers by disconnecting all storm water inlets or clear water lines therefrom, and diversion to new storm sewers.

E. V. Avery

(e) Separation of sanitary flow from combined sewers by disconnecting all building sewers and diversion to new or existing sanitary sewers.

(f) Installation of interceptor devices of small capacity in storm sewers and conveyance of the early flush of stormwater runoff containing organic materials washed off the streets to existing or new trunk sanitary sewers.

(g) Interception of mixed flows and conveyance to suitable storage areas.

(h) Selection of natural storage basins or the determination of prepared storage areas for treatment of mixed flow and release to river.

(2) To select from the alternates identified above those that merit further engineering and economic (benefit vs. cost) investigation and analysis.

(3) To prepare a program of investigation and analysis for comparison of alternatives and for preparation of an overall plan to meet the MPCA requirements.

2. Phase II - The detailed investigations and analyses outlined in the program developed in Phase I.

a. Development of Background Data.

(1) Review reports prepared by the Department of Public Works of the City entitled, "Metropolitan St. Paul Sanitary Sewerage Report" and "City of St. Paul Sewerage and

Drainage Report" with the objective of incorporating into the recommended plan to be developed by the following studies and investigations those sewers proposed in the reports that are compatible with the recommended plan.

(2) Confer with representatives of the MSSD relative to their investigations in connection with the monitoring of overflows in the St. Paul sewer system. Confer with the MPCA on the matter of water quality standards. Confer with the U. S. Army Engineers, St. Paul District, with regard to seasonal discharge of the Mississippi River and related stages as well as present and proposed flood protection works and floodway requirements. Confer with the appropriate regional and local planning agencies relative to projected population numbers and land use data. During the progress of the work, as special situations arise, confer with such other agencies as may be able to contribute additional background data or information pertinent to the investigation

and the development of a recommended plan.

(3) Determine the character of flow, i.e., whether sanitary, storm, clear water or combined, from record information, for each sewer in the tributary service area.

(4) Prepare detailed hydraulic investigation tables for combined sewers, clear water sewers and separate storm sewers under conditions of anticipated area development as of the year 2000.

These tables shall show the following:

(a) Area in acres - subdivided into major classifications of development.

(b) Storm water runoff in cubic feet per second (cfs).

(c) Size of sewer.

(d) Capacity of sewer between successive manholes or junction points based on an acceptable depth of hydraulic gradient.

(e) Flow line elevations and slopes.

(f) Hydraulic gradient elevations and slopes.

(g) Relation between quantity of flow and capacity.

(5) Endorse items (4)-(b), (c) and (d) on key maps of the sewer systems, together with manhole numbers.

(6) Prepare detailed investigation tables for existing separate sanitary sewers under conditions of anticipated area development as of the year 2000 showing the following:

(a) Area in acres - subdivided into major classifications of development.

(b) Estimated population.

(c) Quantity of flow by following components:

1. Population
2. Industry
3. Commercial
4. Institutional
5. Ground water infiltration.

(d) Size of sewer.

(e) Flow line elevations and slopes.

(f) Capacity.

(g) Relation between quantity and capacity.

(7) Endorse items (6)-(d), (e), (f) and (g) on key maps prepared under (5) above.

b. Development of Alternate Plans

(1) Using the background information and data

obtained under 2-a, "Development of Background Data," above, investigate various alternate plans developed in Phase I and such others, as may be necessary, to produce a recommended plan practical of implementation both physically and financially. The recommended plan shall also be capable of construction with a minimum of disruption to the normal daily business and commercial activities of the City.

(2) Prepare estimate of cost for each alternate plan investigated in sufficient detail to establish its comparative physical and economic feasibility.

c. Recommended Plan

After the basic recommended plan has been determined investigate the possibilities of further refinement and improvement of the plan by drainage area controls such as the use of headwater or downstream detention ponds, by special restrictions on the use of land, etc.

Prepare estimate of cost of recommended plan in sufficient detail to determine future financing and budgetary requirements.

The recommended plan shall be reasonable in cost when compared with a plan based on complete separation of storm and sanitary flow for the entire service area. For comparative purposes the estimate of cost of a plan involving complete separation shall be determined by the use of generally accepted unit costs per acre; such costs to be agreed upon by the City and the Consultant.

C. ANCILLARY STUDIES AND INVESTIGATIONS:

1. Investigate present method of handling overflow from Lakes Phalen, Beaver and Como and recommend changes, where appropriate, in control and administration so that conveyance of lake water overflow could be handled through the present combined sewer systems. The Consultant shall also study the interrelation between the lake level controls and the controls and dispatching system now being installed by MSSD and make such recommendations as may be appropriate for achieving the maximum degree of coordination.

2. During the progress of the work, the City may desire the Consultant to study other problems relating to the City sewer system. The Consultant shall perform such services upon receipt of written authorization from the Chief Engineer.

3. When directed by the Chief Engineer, the Consultant shall study for excessive infiltration those areas of the City, which are designated by the Chief Engineer. Such studies shall include consultations with personnel of the City Sewer Maintenance Department and the City Architect's Office.

D. SERVICES BY OTHER CONSULTANTS:

Not included in the work under this Agreement are the rates and financial studies, the preparation of an "Industrial Wastes Ordinance" and recommendations as to administrative and operational changes in the use of the City sewer system.

E. SERVICES BY CITY:

1. Provide its requirement for the Project.

2. Make available for the use of the Consultant all pertinent City records and documents pertaining to the work which would assist the Consultant in the assembly of data necessary for the preparation of plans and estimates. The City reserves the right to establish rules for the time and location that such City records and document would be available for examination, study or copying.

3. Furnish to the Consultant where available aerial surveys, preliminary layouts, platted alignments, grades profiles, and cross-sections, a report of

test borings or soundings, if any.

4. Examine all studies, reports, sketches, estimates, drawings, proposals and other documents presented by the Consultant and render in writing decisions pertaining thereto.

5. Designate persons to act as City representatives with respect to the work to be performed under this Agreement. Such persons shall have complete authority to transmit instructions, receive information, interpret and define City's policies and decisions with respect to materials, equipment, elements, and systems pertinent to the work covered by this Agreement.

6. Give prompt written notice to the Consultant whenever the City observes or otherwise becomes aware of any error, omission or need for modification in the Report.

7. Obtain formal plan approval from all governmental agencies or other parties having jurisdiction over the works identified in the report.

8. Furnish hydraulic design computation forms.

9. Furnish approved City Standard Detail Plates.

10. Furnish copy of City Specifications for Street and Sewer Construction.

11. Assist the Consultant using sewer maintenance crews for installation of flow measuring devices and sewage sampling equipment.

12. Arrange for the Consultant to take to and have analyzed at the City Laboratory, MSSD Laboratory or private lab sewage samples taken from the sewers or connections thereto.

13. Furnish personnel to assist the Consultant to log and analyze the City Water Department records to determine the large water consumers using both private well supplies and the public water supply. The City will furnish its past logs of water users for ease of gathering required information and for purposes of establishing trends in water use.

14. Identify areas of City for testing for excessive infiltration amounts.

15. Furnish Minnesota Geologic Survey "Bedrock Geologic Map of Minneapolis, St. Paul and Vicinity."

16 Furnish surveys as defined below.

III. SURVEYS

A. GENERAL:

Surveys necessary for planning shall be furnished by the City. Surveys shall be complete with respect to details and to such a degree of precision and accuracy as is necessary to develop the planning for the various phases of the report.

B. DATUM:

All elevations shall be referred to City Datum and all bench level work shall be third order accuracy or better, except where specified otherwise.

C. AERIAL SURVEYS AND MAPPING:

The Consultant may desire to use aerial surveys and mapping by photogrammetric methods for some portions of the work. Such aerial surveys and mapping shall be of a nature and of such accuracy as will fulfill the requirements of the Report plans. When the use of aerial surveys and mapping is approved by the City, the City shall furnish said aerial surveys and mapping to the Consultant.

IV. CONFERENCES AND MEETINGS

A. ATTENDANCE AT MEETINGS:

The Consultant shall attend meetings and conferences to offer information and results that pertain to the progress or conclusions of the Phase I and Phase II Reports described in this Agreement. The City will give the Consultant seven (7) calendar days notice of any meeting where the Consultant's attendance is required.

B. PROGRESS REPORTS:

Every three months, the Consultant shall submit a written report to the Chief Engineer outlining progress made since last report; unusual problems or difficulties encountered during this period of the study, mention of agencies contacted and persons involved in said contacts, results of same; an appraisal as to whether the study is on schedule; notification of any obstacles to the progress of the study, even though the overcoming of these obstacles may or may not be within the realm of the City's jurisdiction to correct; recommendations to expedite the study as to personnel that the City has or is employing, etc.

V. TIME SCHEDULE

A. AUTHORIZATION TO PROCEED:

The Consultant shall not start work on any portion of the Project until he receives written instructions to do so from the Chief Engineer of the City of St. Paul.

B. PHASE I REPORT:

The Consultant shall submit the Phase I Report within one hundred twenty (120) calendar days following authorization to proceed. Fifty (50) copies shall be provided to the City.

C. PHASE II REPORT:

The Consultant shall not proceed with the Phase II Report unless and until he shall receive written authorization to do so from the City. Upon receipt of said authorization, the Consultant shall proceed with the Phase II Report and shall deliver to the City fifty (50) copies of the completed Phase II Report no later than four hundred twenty (420) calendar days after receipt of said authorization.

The Consultant shall submit therein preliminary plan and profile sheets for express sanitary sewers, strategic storm or clear water sewers and trunk storm sewers where proposed as part of the recommended plan.

This Agreement may be terminated by the Consultant if he does not receive written authorization to proceed with the Phase II Report within six months after the City accepts the Phase I Report.

D. TIME EXTENSIONS:

The City may extend the aforesaid time completion periods upon written request from the Consultant because of delays encountered that are beyond his control. The extent of this time extension shall be determined by the City.

VI. PAYMENTS TO CONSULTANT

A. BASIS OF PAYMENT:

The City will make monthly payments to the Consultant for approved costs within thirty days of receipt of an invoice from the Consultant. Each invoice shall contain a listing of actual hours billed against the project by the Consultant for the various classes of professional or subprofessional help used on the project in the previous month in accordance with the following hourly schedule:

Engineer I	$18.70 per hour
Engineer II	16.50 per hour
Engineer III	14.85 per hour
Engineer IV	13.75 per hour
Engineer V	12.10 per hour
Draftsmen I	11.00 per hour
Draftsmen II	8.80 per hour
Stenographic	5.50 per hour
Reproduction	7.70 per hour

The above rates are based upon "salary cost" as defined in "Consulting Engineering ----A Guide for the Engagement of Engineering Services" published as Manual of Engineering Practice No. 45 by the American Society of Civil Engineers and a multiplier of 2.2 to compensate the Consultant for overhead, profit, out-of-pocket expenses, etc. The payroll cost portion of the "salary cost," as defined above, for Engineers I, II, and III, who receive a nominal monthly "drawing account," is based upon a survey entitled "Professional Income of Engineers - 1966" conducted by the Engineering Manpower Commission of Engineers Joint Council. Payment will be made by the City to the Consultant only on the basis of the above schedule and no additional payment will be made for miscellaneous items such as transportation and subsistence; communication expenses such as long distance telephone, telegraph and postage; drafting and stenographic supplies; reproduction supplies; and other out-of-pocket expenses.

The City reserves the right to make full and complete audit of the Consultant's bookkeeping records to verify to the City's satisfaction the propriety and correctness of any billing to the City for services rendered under this Agreement.

B. LIMITATION OF EXPENDITURE:

The amount payable to the Consultant by the City under the terms of this Agreement shall not exceed Thirty Thousand Dollars ($30,000.00) for Phase I nor One Hundred Forty Three Thousand Dollars ($143,000.00) for Phase II, provided, however, that these amounts may be increased by mutual consent of the parties hereto, by amendment to this Agreement if full completion of Phase I or Phase II so requires. The maximum amount payable to the Consultant by the City pursuant to this Agreement shall therefore not exceed One Hundred Seventy Three Thousand Dollars ($173,000.00) unless and until this Agreement be amended.

CITY OF SAINT PAUL

Approved as to form:
Jerome J. Segal
Assistant Corporation Counsel

By ROBERT F. PETERSON
Acting Mayor
Robert F. Peterson
Commissioner of Public Works

Attest:
Harry E. Marshall City Clerk

Approved as to form and
execution this 18 day
of April, 1968.
Jerome J. Segal
Corporate Seal

Countersigned:
Joe Mitchell City Comptroller

HORNER & SHIFRIN, INC.
E. E. Bloss
E. E. Bloss, President)

MR. STEIN: Thank you, Mr. Avery.

Are there any comments or questions?

(No response.)

MR. STEIN: There is one point I would like to bring up here for clarification.

As I understand it, the State is not proposing swimming water quality in the sewer system effluents. They are proposing a coliform count of what?

MR. BADALICH: 5,000.

MR. STEIN: 5,000. That is a little above swimming.

MR. AVERY: Well, I don't have the Standards here, but, as I recall it, there is mention in the Standards of no fecal contamination and the BOD requirements are sufficiently high so that the effluents from a sewer system could be used for a municipal water supply, and could be swum in.

If I am in error on that, why, I will apologize, but this was my understanding.

MR. STEIN: I checked that with Mr. Badalich while you read that. Maybe he wants to comment on it.

MR. BADALICH: Mr. Chairman, it is our understanding that the permissible limit would be 5,000 milligrams per liter.

MR. STEIN: Generally, it is 1,000, as you know, for swimming, except in certain circumstances.

MR. AVERY: Well, I think the main point that I was making, whether we are talking about 5,000 milligrams of coliform per liter or 1,000, was that achieving the standards will require a vast expenditure of money, and we feel that probably the standards would be more economically achieved by some form of treatment of overflows, rather than complete separation.

MR. STEIN: You have made a good start.

I do not want this to be construed as completely a commercial plug, but we have worked with and had dealings with the firms you have hired in other projects, and we have been completely satisfied.

In particular, the Horner & Shifrin firm did that big job in St. Louis in that tremendous sewer. The sewer was so large that while it was being built they used to go up and down on tracks with a train like a subway. That was a magnificent job, so I am sure it will not be for lack of imagination or talent that you won't come up with a plan.

I am very encouraged with your description of the progress and the people who are doing it.

MR. AVERY: Thank you.

MR. STEIN: Are there any other comments or questions of Mr. Avery?

(No response.)

MR. STEIN: If not, thank you very much.

Mr. Badalich?

MR. BADALICH: Mr. Chairman, if I may continue, I would like to call on the City of South Saint Paul. I believe the Engineer, Mr. Donald Peterson, is here.

STATEMENT OF DONALD R. PETERSON, CITY ENGINEER, CITY OF SOUTH SAINT PAUL, MINNESOTA

MR. PETERSON: Mr. Stein, I have copies of my statement and I would like to present a brief summary of the statements. I would like to submit these as a matter of record.

MR. STEIN: Let me look at it.

MR. PETERSON: I would like to make a summary of the statement for verbal presentation and ask that you accept the complete report, which is quite lengthy and includes a revised annual report of our sewage treatment plant for the last year.

MR. STEIN: Do you want this whole statement to appear in the record?

MR. PETERSON: Yes, sir, I would.

MR. STEIN: Without objection, this will appear in the record as if read.

MR. PETERSON: This is a statement of the City of South Saint Paul's progress in combating water pollution by providing adequate sewerage and sewage treatment facilities.

This problem of pollution on the Mississippi River has been with us a long time. Forty-one years ago, in 1927, the Minnesota Legislature under Chapter 181 of the General Laws of 1927, formed the Metropolitan Drainage Commission. This body was charged with the responsibility to study the then terrific pollution problems and to make recommendations as to how to alleviate them.

From the studies it became apparent that sewage treatment facilities had to be built. It was then, as now, a problem to decide as to whether the one-plant concept be followed, or should individual communities build their own plant. In 1933 it was decided that the individual communities should go it alone.

The City Council of South St. Paul then formed a sewage commission and orders to prepare plans and specifications for a plant were issued. Construction on South St. Paul's plant was started in 1939 and the plant has operated continuously since mid-1941. Chart No. 1 is a summary of some of the data that has been collected over the past 27 years.

The BOD of the raw sewage has increased by only 11 percent, not counting the war years, but due to the increase in flow, the population equivalent kept increasing from the low of 422,000 in 1944 to a high of 917,000 in 1963. Correspondingly, by 1957 the overall efficiency, as indicated by the percent of

BOD removal (See Chart No. 1), had dropped from 80 percent to a low 60.4 percent, and this was due mainly because of the increased volume. With this low efficiency it was then evident that some additional treatment was necessary in order to maintain dissolved oxygen in the Mississippi River at an acceptable level. Therefore, pilot plant studies were started by the sewage treatment plant personnel to study the feasibility of using an anaerobic stabilization pond for further treating of the plant effluent.

Early studies indicated that such a pond could be expected to remove an additional 50 percent of the plant effluent BOD. It was determined that by buying a few more acres of ground, a 27-acre pond could be constructed.

This pond would be of sufficient volume to provide a detention of the plant effluent for five days. Subsequently, the South St. Paul City Council authorized the purchase of the necessary land and directed the city to advertise for bids for pond construction. The pond was built during the winter of 1962-1963 and was placed in operation on a limited scale in 1963.

Due to heavy winds damaging the baffle wall, the flood of 1965 and the installation of the flood control dike in 1965 and 1966, the first complete year of the use of the pond was the calendar year of 1967 (See Chart No. 2). During the presentation this will be presented with overlays, but herein the chart is on one sheet.

The first solid black column is the thousands of pounds of BOD loading of raw sewage for week days or killing days in the sewage treatment plant influent. This plant influent contained 131,000 pounds of BOD; and the effluent, also a solid black line, contained 16,000 pounds of BOD. This provided an overall removal of 87.7 percent for the calendar year of 1967. Note: The influent to the pond, shown in black on the chart, was 53,700 pounds. Thus the ponding contributed a BOD removal of 71 percent of the loading placed upon it.

The cross-hatched columns indicate the degree of loading that the pond could receive and still produce an effluent BOD of 50 ppm. It is hoped that the reduction of BOD loading of the pond influent necessary to produce an effluent of 50 ppm BOD can be accomplished by the use of chemicals along with the possible installation of two more roughing filters. The stippled columns represent the BOD loading in 1000# of the raw sewage, the pond influent and the pond effluent for the critical months of July, August and September 1967. Please note that the overall removal by the entire sewage treatment plant, including the pond, for these months was in the order of 92.7 percent.

Late in the year of 1960, West St. Paul asked South

St. Paul to study the possibility of taking the sewage from the south half of their city. In 1961, the firm of Comstock & Davis was retained by the City of South St. Paul to study the flows from the industries and the interceptor sewer to determine the capacity of the interceptor.

The study revealed that the interceptor sewer was surcharged and was too small for South St. Paul sanitary sewage and industrial flows, and that any small rain shower or an unusually heavy usage for a short period more than filled the sewer to capacity. It was obvious that this condition had to be corrected by the installation of a bigger or a second interceptor sewer. It was reported to West St. Paul that the interceptor sewer was of insufficient capacity to receive their flow without construction of a new interceptor sewer. They then decided that it was not economically feasible to join with South St. Paul (Turn back to Chart No. 1).

By 1964, even with the pond in service, the BOD in the effluent of the plant was stronger than desired. Therefore, the City of South St. Paul (July 1964) retained the engineering services of Greeley & Hansen and Banister Engineering Company to study the sewage treatment plant problems and to make a report with recommendations as to what facilities would be needed to treat the heavy packing plant wastes to produce an effluent of 65-75 ppm.

D. R. Peterson

In March of 1963, the Minnesota Water Pollution Control Commission established "Classification and Standards for the Mississippi River and Tributaries." Doctors Susag and Schroepfer of the University of Minnesota at that time estimated that an effluent of the previously mentioned quality would be needed to maintain a D.O. content as required by the classification standards.

Our engineers then arrived at a comprehensive plan to meet the required standard. This plan contemplated construction in three phases. It should be noted that certain revisions in criteria have been made and that our proposed design now will produce an effluent of less than 50 ppm BOD or approximately 96 percent treatment. This we contemplate as the ultimate economically feasible treatment that can be accomplished. The construction of the improvements are to proceed as follows:

Phase I. Division A consists of the construction of a second interceptor sewer to convey only the industrial wastes from Swift and Armour with the possibility of the Rifkin packing plant and Van Hoven rendering plant wastes and a city **watermain** extension to the sewage treatment plant.

Division B consists of the construction of a lift station at Grand Avenue to lift the industrial wastes into the new interceptor sewer.

Division C consists of the construction of a new industrial sewer pumping station, new grit chambers, new chlorine contact tanks and installation of pipes, motors and pumps. Along with the construction of the above-mentioned items, there will be constructed facilities to demonstrate the feasibility of a chemical flocculation process. This portion of Division C will be constructed under a Federal demonstration grant.

Phase 2 consists of the construction of additional secondary filters, additional roughing filters, additional pumping stations, and additional sedimentation tanks. This design is tentative and may be altered, depending on the success of the demonstration grant project.

Phase 3. This phase will consist of sludge disposal facilities. It is anticipated that the three phases will cost approximately $10 million. This proposed expenditure caused great concern to the affected industries, as well as the citizens of South St. Paul.

In order to determine if a less expensive method could be used, Armour, Swift, the stockyards and industries then hired Toltz, King, Duvall, Anderson & Associates, a St. Paul engineering firm, to review the Greeley & Hansen and Banister Engineering Company analysis and report with the intention of recommending possible other methods of treatment that might substantially reduce the ultimate costs. In February 1966, T.K.D.A. Engineers presented their report, which, in effect, nearly confirmed the 1965 Greeley & Hansen and Banister report. However, this report showed some savings if certain sludges were lagooned. They recommended the anaerobic contact treatment process and the lagooning of anaerobic contact sludge in place of trickling filters. (This represented a difference in cost of the two processes of more than $1 million, but would mean that open-air sludge lagoons would still exist.) Our present plan includes incineration or other methods of ultimate disposal of sludge.

In July 1966, the City Engineer was contacted by Mr. Robert Hansen, representing the industries, and Mr. Donald Blaisdell, asking that the use of the so-called "Blaisdell & Klaas" process of high rate solids sedimentation be explored as a possible way of increasing the efficiency of the plant without the necessity of the costly filters or the anaerobic contact process. This process was referred to earlier as the demonstration process.

In December 1966, an application was made to the Federal Water Pollution Control Administration for a grant in aid for the construction and operation of a demonstration project to determine the feasibility of using the "Blaisdell & Klaas" process. After many delays, such a demonstration grant was granted on June 19, 1967, to cover 52 percent of the estimated cost of $845,000 for facilities and equipment to carry out the study.

The construction part of the grant was incorporated with Division C of Phase I construction for which contracts have been awarded. This demonstration study is to be completed in late 1969. However, before that time, sufficient information should be obtained to indicate if this process might be substituted for the Greeley & Hansen and Banister Engineering planned Phase II expansion. This process, if successful, may represent a substantial savings to the City of South St. Paul and its industries, as well as furnishing worth-while information for the national sewage treatment industry.

In October 1967, Greeley & Hansen and Banister Engineering furnished all plans and specifications for the three divisions of Phase I and bids were received for these three projects. These bids, incidentally, were received in November. Based on the bids, the cost for each division is:

Division A	Interceptor Sewer and Watermain Extension, which includes engineering, etc.	$ 428,226
Division B	Grand Avenue Pumping Station, which includes engineering, etc.	172,686
Division C	Sewage Plant Improvements	

and demonstration structures, which includes engineering, etc.	$2,406,178
Total Phase I Costs	$3,007,090

The work has been started on all three divisions with Division A better than 75 percent completed. Division B is about 35 percent complete and Division C is about 20 percent complete at this time.

For a clearer understanding of what is covered and what is to be done under Division C, examine Chart III. (During the presentation of this statement, a base drawing of the existing plant will be shown with overlays for the various improvements.) The black-inked-in facilities were the original structures, the facilities inked in red are construction items under Division C that do not come under the Federal Demonstration Grant, while the facilities inked in green are structures that are a part of the Demonstration Grant. All the construction is scheduled to be completed by June 1969.

In addition to all of the above-mentioned expenditures, the U. S. Army Corps of Engineers, together with the city, started construction of a flood control dike to protect the flood plain in South St. Paul. Upon the recommendation of the late Mr. W. H. Cropsey, past superintendent of the sewage treatment plant, the city initiated the extension of the floodwall so that the sewage treatment plant and the sludge lagoons were included within the flood protected area. This extension makes it possible to operate the sewage treatment plant during a flood and prevents the contamination of the river by flooding of the sludge lagoons. The extension of this floodwall increased the cost of the floodwall project approximately $350,000. It is anticipated that this extension will also make available a larger area to be used for storage of **stormwater** which may ultimately be treated.

The packing industries have realized their obligation in abating this pollutional problem and after initial design was completed, they made plans for in-plant improvements and initiated a stringent clean-up program to reduce as much of the BOD as possible. At this time, the plants were producing about 20 pounds of BOD per bullock. By the spring of 1966, Armour's had reduced its pounds of BOD per bullock to less than ten pounds, and gallons of **wastewater** from 1255 gallons to 1123 gallons per bullock. In addition, Armour cleared up the BOD of their clear water by changes in operation. The last test showed less than 20 ppm in the clear water lines, and Mr. James Rowe, Chief Chemist for Armour, says that the coli-aerogenes tests met river standards.

I would like to add at this point that the industries on April 1st started a program of testing all of their clear water discharged to the river, and these tests will be taken periodically and reported to the Minnesota Pollution Control Agency. As they are taken, they will be testing for BOD, suspended solids, settleable solids, pH, and temperature, at all clear water outlets; so I am confident that the industries will be submitting these reports to the Minnesota Pollution Control Agency.

Swift has installed a Pacific Grease Separator, a jet blood drier, and an electrolytic decoagulation system for handling blood. These items represent an expenditure of over $300,000 by this company to decrease the sewage strengths contributed by them. Improved operational practice has lowered the volume by over 440,000 gallons per day since initiation of the program. These in-plant improvements are reflected by the abrupt drop in the average population equivalent in the raw sewage for week days in 1966 which shows the effect of these improvements in operation. Some of these facilities were installed in 1967 and their effect was not reflected in the 1966 report, and these facilities should result in an even further reduction.

The Saint Paul Union Stockyards Company has installed a programmed water system. It is anticipated that this programming system will reduce the dirty water flow from the yards by some 30 percent. Additionally, the old truck wash at the North end of the yards was closed October 2, 1966, and a new high-pressure wash facility was opened. This new facility has a good cattle truck dry cleaning area and washer with a settling basin with a 1/4" screen at its overflow end. BOD of the effluent of this new truck wash is in the order of 400 ppm, compared to 630 ppm of the old facility. The former used far more water due to the much lower pressures which resulted in more time and volume of water being required to wash each truck.

In addition to items that are reflected in population equivalent and flow, both Armour and Swift & Company have arranged for hauling dry from the plant the cattle rumen from their cattle kills. The material will amount to some ten to twelve dry tons per day. If the anticipated use for this material proves to be feasible, this rumen no longer will be emptied into the wastewater sewer.

This was mentioned earlier today, and I would like to report that both Armour and Swift are removing all of the cattle paunch manure or rumen, but not the sheep and hog material.

Mr. Stoddard, who is the inventor of the process of feeding this rumen to cattle, **has applied for a Federal grant and** is updating and promoting his process of using this waste material.

During the past 25 years this material has been emptied into the sewer and had to be removed along with the grit at the sewage treatment plant. Because of the predominantly plant fibrous nature of the rumen, the removal of this material will not constitute a considerable BOD reduction, since plant fibers digest slowly and much of their oxygen demand is not measured by the 5-day BOD. However, the removal of the cattle rumen from the sewer will be reflected in a substantial reduction in sludge that has to be handled and disposed of at the sewage treatment plant. It is anticipated that when test figures are compiled on the flows during 1968, we will see a substantial drop in both BOD and volumes contributed by the industries.

After all of the above-mentioned improvements are accomplished, the South St. Paul Sewage Treatment Plant will then be able to produce an effluent of 50 ppm BOD. This will be in compliance with the general regulations for discharging sewage into an interstate watercourse, as recommended by the States of Minnesota and Wisconsin and the Federal Government and the WPC standards now in effect, whichever is applicable and finally adopted for this reach of the Mississippi River. To date no mention has been made of the 50 ppm of suspended solids. This is because past experience has indicated that in reaching the 50 ppm BOD, the South St. Paul Sewage Treatment Plant will be producing an effluent with considerably less than 50 ppm suspended solids. The contract is now let for new and improved chlorination facilities and plans are made to operate the facilities from April through November or in accordance with any variance for a lesser period that may be granted to the Minneapolis-St. Paul Sanitary District.

In accordance with the State of Minnesota Water Pollution Control Commission Proposed Plan for Implementation of Criteria for the Interstate Waters of Minnesota, Paragraph two, "Sewage from Storm or Combined Sewer Outlets," the City of South St. Paul has considered several methods of accomplishing the elimination of gross contamination of the Mississippi River by overflows during rains and periods of heavy runoff from our combined sewers. Several methods of accomplishing this were considered. The three methods most promising were:

1. The complete separation of storm and sanitary sewers, the cost of which would be economically unfeasible.

2. The use of holding ponds at or near the various interceptor structures and the use of the Federal flood control holding ponds and the present anaerobic stabilization pond. These areas could be supplemented by the present sludge lagoons at the sewage treatment plant when another method, other than lagooning of sludge, is used. The stored combined sewage could then be passed through the sewage treatment plant at a rate acceptable to the plant.

3. During July 1967, the city discussed our combined sewage problem with the engineers from MacKichan and Madsen and they suggested the possibility of detention of the combined sewage by introducing it into natural, permeable, underground formations. As in method No. 2, the combined sewage after the period of heavy runoff subsided would be removed and passed through the sewage treatment plant. Since this would be an unusual and

questionable method of storage and the City of South St. Paul thought it to be in the nature of a research project and since there were too many unknown and unproved procedures, the city proposed that the engineers obtain a Federal grant to study the feasibility of the project. Consequently, on January 30, 1968, the City of South St. Paul Engineering Department submitted all the necessary technical data to the engineers from MacKichan and Madsen along with the necessary resolutions by the City Council for proceeding on making an application for such a study.

I would like to add that this has been submitted to the Minnesota Pollution Control Agency and has been forwarded to the Federal Water Pollution Control Administration for consideration and approval.

If the grant is obtained, the study will be conducted in three phases over a 15-month period.

Phase I would consist of basic investigations to update geological and hydrologic data.

Phase II would consist of field testing of various sewages to be stored.

Phase III would consist of field testing and evaluation of systems. It is hoped this study may reveal a much less costly and equally as effective method of elimination of the combined sewer flow problem and this method might be even less costly than holding ponds.

Again I wish to emphasize, as you know, the design of the South St. Paul Sewage Treatment Plant improvements have been designed to reach the proposed 50 ppm BOD and any additional demands for a lesser BOD in the plant effluent are an imposition and seems impractical to us, and that neither the City of South St. Paul or its industries can afford and live with.

I wish to again emphasize that the packing industries have been expending much money and effort to reduce their pollutional load and that this, coupled with the expenditure of between 5 and 10 million dollars for sewage plant improvements will enable South St. Paul and its industries to meet their obligations in preventing water pollution.

In summary, I wish to make the following observations concerning the proposed revised WPC standards No. 18 presented by the Minnesota Pollution Control Agency.

1. The original recommendations of an effluent standard of 65-75 mg/liter BOD were taken into account on our original proposals for sewage plant improvements.

2. These standards were revised upward to produce an effluent of 50 mg/l BOD and chlorination from April through November upon recommendation by the State Pollution Control Agency and the Federal Government.

D. R. Peterson

These recommendations took into account future uses of the Mississippi River.

3. The city has complete preliminary plans to revise our plant to meet this requirement and after much negotiations with the affected industries, have arrived at a cost-sharing plan, based on standards recommended by the Federal Water Pollution Control Administration at the 1967 conference. We have initiated construction of over $3 million of our contemplated $10 million program.

4. An effluent having a maximum BOD demand of 50 ppm or mg/liter will involve over 96 percent treatment and is about the maximum degree of treatment that can logically be demanded and still be economically feasible.

The arbitary imposition of an effluent having a 5-day biochemical oxygen demand of 35 milligrams per liter will involve an unnecessarily strict requirement that neither the affected meat packing industries nor the City of South St. Paul could live with.

I wish to point out that the City of South St. Paul and the affected meat packing industries contemplate accepting the entire responsibility of treating the domestic and industrial sewage equivalent for a population of approximately 800,000 persons as measured by the population equivalent to an extent of approximately 96 percent BOD removal. This treatment will result in an effluent quality which will meet the recommendations of the Federal Water Pollution Control Administration and State Conference.

The industry contributing the majority of this sewage load serves the entire State of Minnesota, as well as surrounding States, employs over 6,000 persons, the majority of whom live in communities other than South St. Paul, and is a major industry benefiting the economy of the entire metropolitan area. We have agreed to assume the entire cost of treating this sewage to comply with the recommendations of the conference.

5. The new proposal requiring an effluent having a maximum 5-day BOD demand of 35 mg/l is based on the assimilative quality of the river as calculated by the Federal Water Pollution Control Administration. There is a definite disagreement over the validity of some assumptions made in these calculations and it is most imperative the correct criteria is used in arriving at a permissible BOD load.

6. In view of the question of the actual assimilative qualities of the river and the extreme demand of treatment approaching 98 percent BOD removal, the City of South St. Paul takes a similar position to the

Minneapolis-St. Paul Sanitary District in requesting that the proposed revisions of the standards be canceled until more data can be obtained which proves that a 5-day BOD of 35 mg/liter is needed to produce a minimum dissolved oxygen content of 3 mg/liter, or establish a standard which would require a 5-day BOD demand of 50 mg/l as recommended by the Federal Water Pollution Control Administration at the last conference.

I would also like to state at this time that we endorse the Minnesota Pollution Control Agency recommendation No. 17 on Page 7 of the report that was submitted today; that consideration of those standards be deferred for two or three years to allow for proposed improvements to be completed and further evaluation of assimilative qualities of the river be made.

At this time we wish to express our appreciation to you for giving us the time to present in detail our complete program for improvements to the interceptor and waste-disposal system. We are hopeful that the well-meaning groups, who have from time to time criticized our progress without full knowledge of our continuing efforts, will now realize that our work and effort has been continuous and will result in adequate facilities to meet the standards set forth by all of the regulating agencies.

D. R. Peterson

Respectfully submitted in behalf of the City Council and the Sewage Disposal Commission; the Mayor, Philip Woog; myself, Donald R. Peterson, City Engineer; and Keith D. Larson, Superintendent of the Sewage Treatment Plant.

Thank you.

(The remainder of the statement submitted by Mr. Peterson is as follows:

ESTIMATE OF COST FOR

SOUTH ST. PAUL SEWAGE TREATMENT PLANT EXPANSION

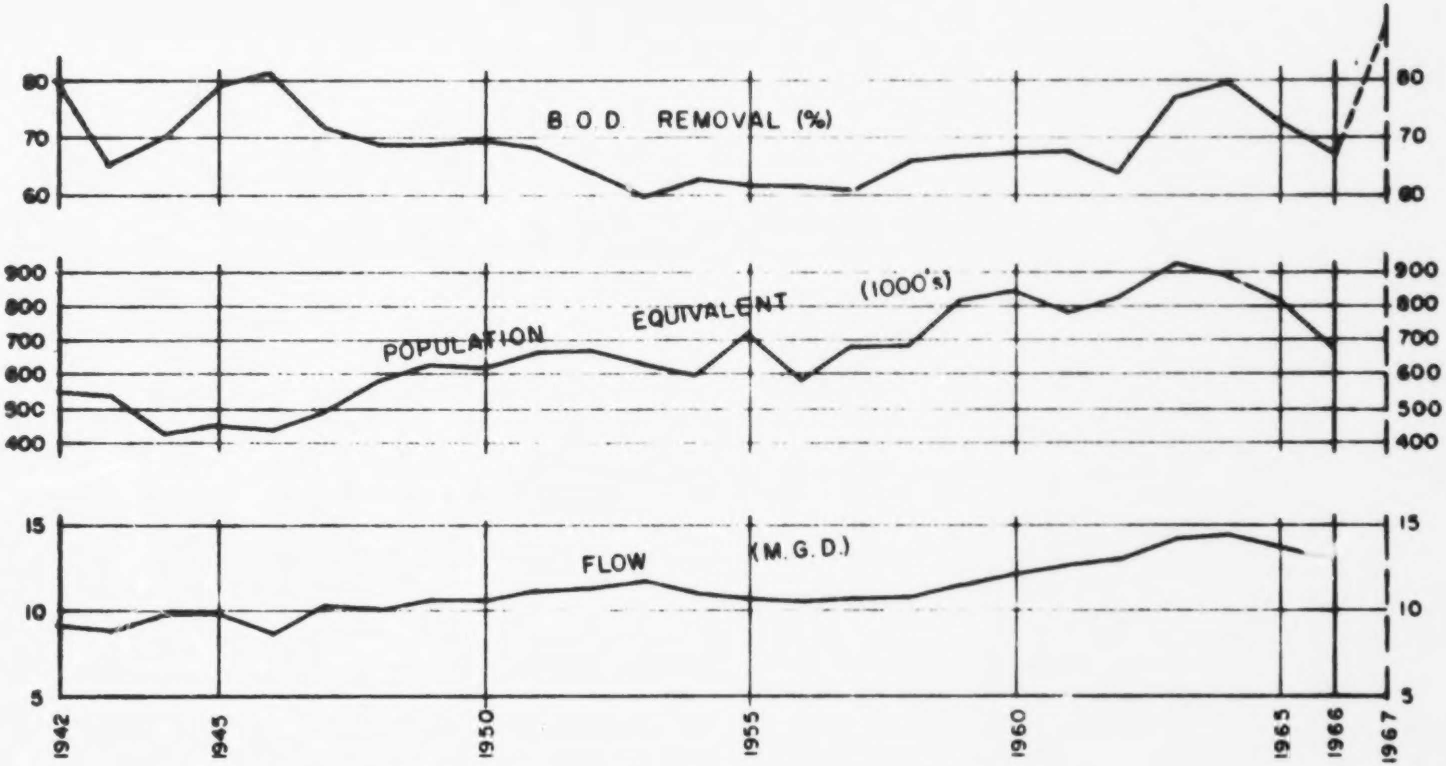
Phase I

Division A	Industrial Waste Sewer and Watermain Extension	$ 366,006.00
Division B	Waste Water Pumping Station	147,597.00
Division C	Sewage Works Additions and Improvements	2,174,000.00
	Construction Cost	2,687,603.00
	Miscellaneous Other Costs	403,140.00
	Total Phase I	$3,090,000.00
	Phase II and Phase III	
	Further plant expansion and construction of sludge disposal facilities	6,900,000.00
	Total anticipated cost	$9,990,000.00

SOUTH ST. PAUL, MINNESOTA

SEWAGE TREATMENT PLANT

CHART I



1965 - POND OUT OF SERVICE DUE TO FLOOD

1966 - POND OUT OF SERVICE DUE TO FLOOD DIKE CONSTRUCTION

DOTTED LINE INDICATES ANTICIPATED B.O.D REMOVAL - 1967

SOUTH ST. PAUL, MINNESOTA

SEWAGE TREATMENT PLANT

CHART II

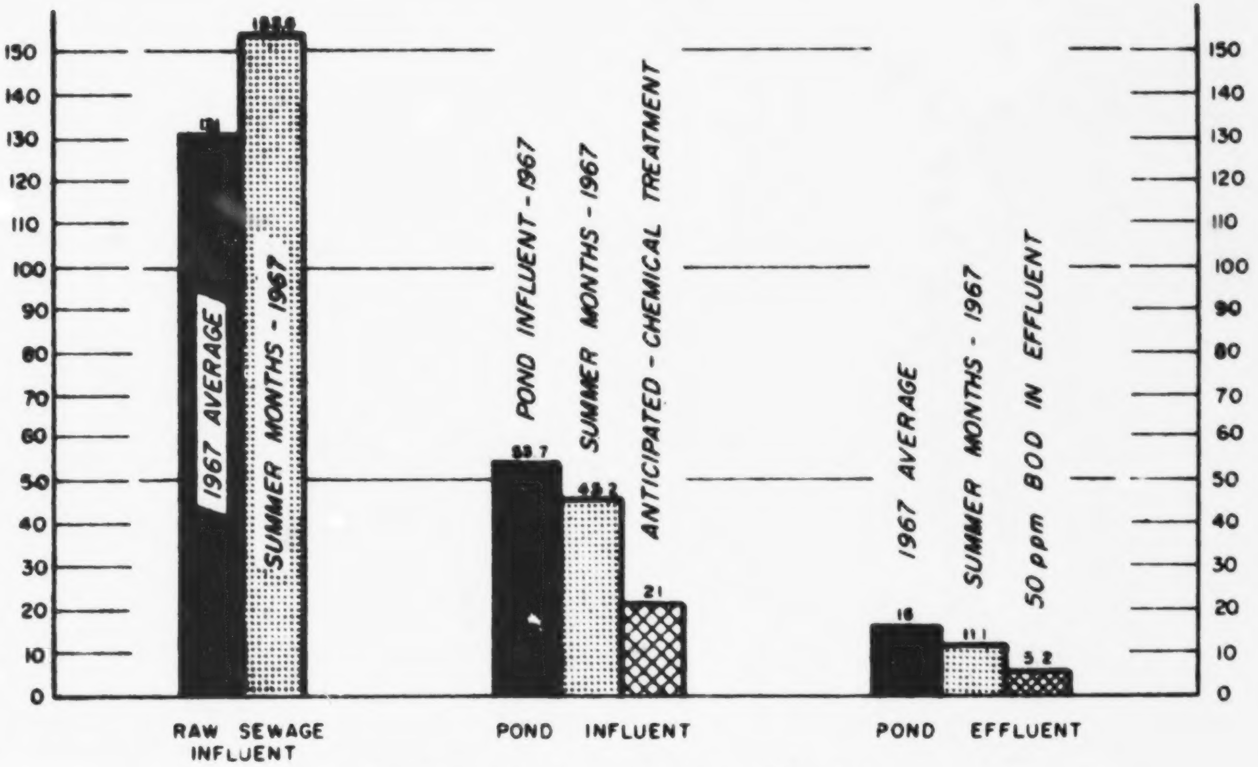


FIGURE IN 1000 LBS. B.O.D. - WEEKDAYS

TREATMENT:

PRESENT 1967 AVERAGE OPERATING EFFICIENCY	87.0% BOD REMOVAL
SUMMER MONTHS 1967 OPERATING EFFICIENCY	92.7% BOD REMOVAL
CHEMICAL AND/OR BIOLOGICAL ADDITIONS	96.0% BOD REMOVAL

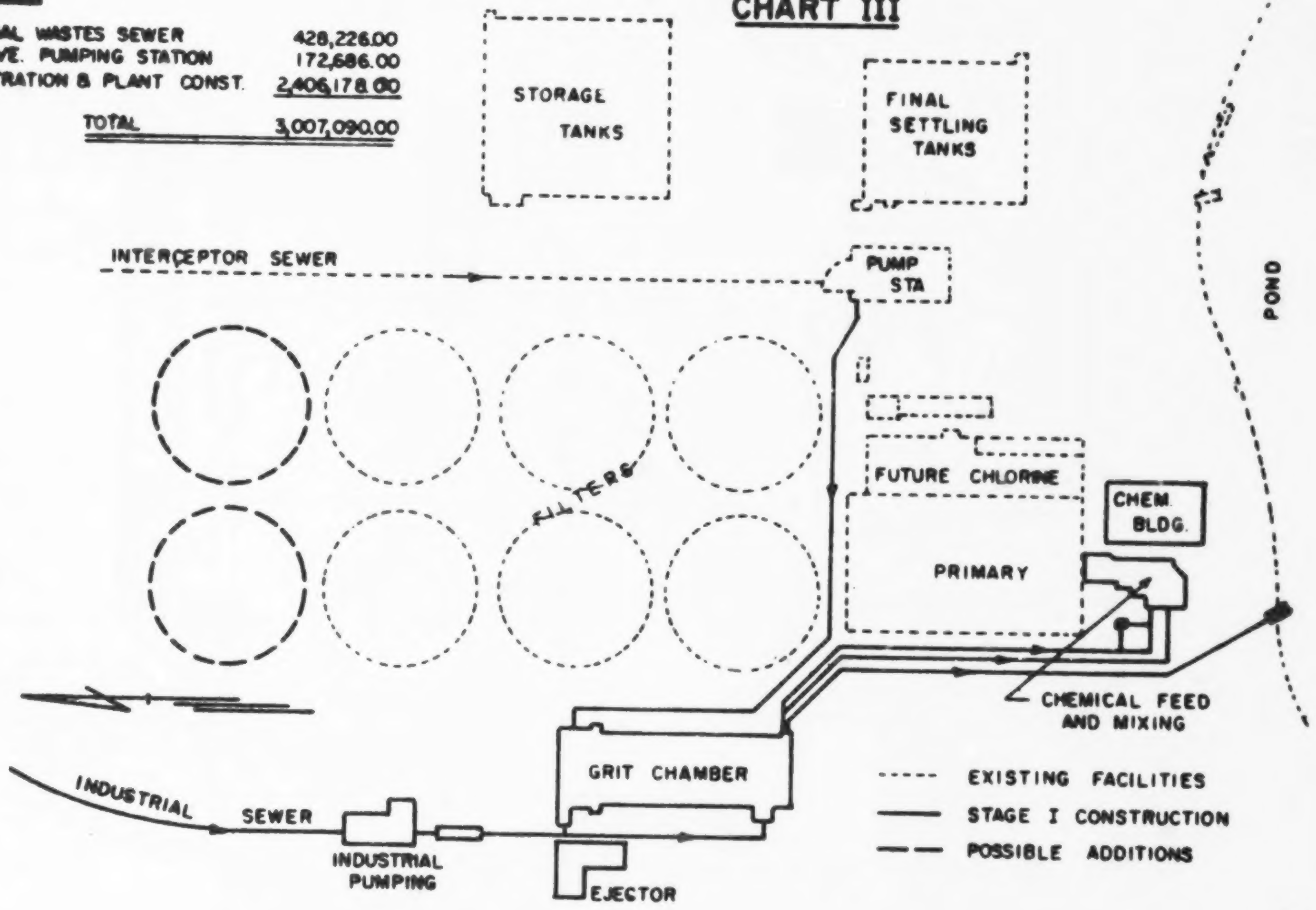
SOUTH ST. PAUL, MINNESOTA

SEWAGE TREATMENT PLANT

CHART III

STAGE I CONSTRUCTION:

DIV. A - INDUSTRIAL WASTES SEWER	428,226.00
DIV. B - GRAND AVE. PUMPING STATION	172,686.00
DIV. C - DEMONSTRATION & PLANT CONST.	2,406,178.00
TOTAL	3,007,090.00


STORAGE TANKS
FINAL SETTLING TANKS
INTERCEPTOR SEWER
PUMP STA
POND
FILTERS
FUTURE CHLORINE
CHEM. BLDG.
PRIMARY
CHEMICAL FEED AND MIXING
GRIT CHAMBER
INDUSTRIAL SEWER
INDUSTRIAL PUMPING
EJECTOR
EXISTING FACILITIES
STAGE I CONSTRUCTION
POSSIBLE ADDITIONS

TWENTY-EIGHTH ANNUAL REPORT

SEWAGE DISPOSAL COMMISSION, SOUTH SAINT PAUL, MINN.

April 1, 1967 to March 31, 1968

SEWAGE DISPOSAL COMMISSION

Mr. R. M. Dall	President
Mr. Howard Milbert	Vice-President
Mr. Henry Zika	Secretary

SEWAGE TREATMENT AT SOUTH ST. PAUL, MINNESOTA

The South St. Paul Sewage Treatment Plant is located near the southerly city limits of the City of South St. Paul on the west bank of the Mississippi River approximately 4-1/2 miles downstream from the Minneapolis-St. Paul Sanitary District Plant. The City of South St. Paul is a city of the 2nd class with a popultion of 24,000, having an industrial and sanitary sewage flow with a population equivalent of 816,000 for a ten-year average, with last year's (1967-68) population equivalent averaging 754,000.

Many persons confuse the South St. Paul Sewage Treatment Plant with the Minneapolis-St. Paul Sanitary District

Plant. The latter treats sewage from Minneapolis and St. Paul, while the former handles the sewage and industrial wastes from the City of South St. Paul, a separate city and adjacent to and southerly from the St. Paul city limits.

Prior to 1940, the large packing plants of Armour and Swift and several small packing plants in the City of South St. Paul discharged wastes into the Mississippi River without treatment. This was not an intentional misuse of public property, since for many years it appeared that the 11,800 cu. ft/sec average flow of the Mississippi River was large enough to take care of the sewage of Minneapolis, St. Paul and South St. Paul by dilution. No doubt this was an influencing factor in the location of these industries.

In 1914, however, the Twin City Lock and Dam was built. This created a large quiescent pool which rapidly became offensive due to its septic condition and to floating sludge solids. It became apparent that the Twin Cities must do something about the sewage which emptied into this pool; but before plans could be made for corrective measures, the Federal Government came out with a River and Harbors Program. This program was the "Nine Foot Channel Project" which would make possible larger barge traffic on the Mississippi, up to St. Anthony Falls.

To create the 9-foot channel required for this improvement below the Twin City Lock and Dam and through the cities of

St. Paul and South St. Paul, another lock and dam had to be built about 30 miles below the Twin City Dam. This dam is now known as Hastings Dam.

When the 9-foot channel project was announced, it was obvious that on its completion the Twin Cities and South St. Paul would have two septic pools instead of the one previously mentioned. Accordingly, interested parties such as the Minnesota Public Health Department, the Metropolitan Drainage Commission and the South St. Paul engineers carried out extensive studies to determine what should be done to eliminate the pollution of the Mississippi. These studies showed that (1) it was advisable for the Twin Cities and South St. Paul to treat their wastes (this was upheld by the Minnesota State Legislature, and in 1933 a law was passed making it mandatory for the Metropolitan area to treat all its sewage and industrial waste). (2) The cities of St. Paul and Minneapolis should build a sewage treatment plant, and (3) the City of South St. Paul should build a sewage treatment plant.

Upon completion of preliminary studies the City of South St. Paul proceeded with the construction of the necessary intercepting sewer and a sewage treatment plant at a total cost of $1,235,227.34. The South St. Paul plant as designed and constructed is one of primary treatment plus single stage filtration and final settling, with facilities for chlorination and provides for the removal of solids and disposal of same in open sludge lagoons. Expected removals and reduction of oxygen demand 70%. Funds were not available for the inclusion of sludge treatment units or incineration, but the plant was laid out to permit the future addition of these units if they become necessary. Operating records up to the present time show that expected remoals can be exceeded and that the type of treatment and design of plant has been very satisfactory.

By 1958 it became apparent that more intensive treatments would be required by both the Minneapolis-St. Paul Sanitary District and the South St. Paul plants; for the dissolved oxygen in the Mississippi River, during the late summer months, in the reach several miles downstream often dropped to zero. Pilot plant studies conducted by South St. Paul treatment plant personnel indicated that the plant effluent BOD could be further reduced bv more than 50 percent by passing the effluent through an anaerobic pond of sufficient capacity to afford at least a five-day detention period. Since such a pond could be expected to be as efficient, if not more efficient than additional conventional treatment units such as secondary filters and could be built for a fraction of the cost, the South St. Paul City Engineer, with the approval of the Sewage Disposal Commission and the South St. Paul City Council went before the Minnesota State Board of Health and the Water Pollution Control Commission and requested the approval of plans for building an anaerobic stabilization pond to further treat the plant effluent. The approval was granted February 2, 1962.

As planned (see map on last sheet), a somewhat L-shaped anaerobic pond of approximately 26 acres was built in the summer and early winter of 1962 at a cost of $157,000. This cost included the acquisition of some ten additional acres of land.

The plant, except for the pond, as originally planned, was designed on the basis of 10 MGD flow. The raw sewage first passes through one-inch manually cleaned bar screens, then to Wet Well #1, and raw sewage pumps which are two 10 MGD and one 5 MGD motor-driven units located below sewer level for continuous prime. One 10 MGD pump is equipped with gas drive unit (125 H.P.) able to pump up to 13 MGD rate in case of power failure.

The sewage is pumped from Wet Well No. 1 to the three-unit primary settling (roughing) tanks through Venturi meters. Each primary unit is 10.5 ft. wide by 8 ft. water depth by 110 feet long; affording a 30 minute detention at 10 MGD rate. Each tank is equipped with sludge and grit removal mechanisms and skimming and scum removal mechanisms.

Sludge from the primary tanks is carried by a cross-conveyor to an ejector and ejected by air to lagoons. As this material piles up some is burned and some is processed for use as a fertilizer base.

The grease, scum and sludge from the intermediate and final tanks are disposed of by lagooning, while the grease from the primary tank is sold to a rendering plant, for which the plant receives several thousand dollars a year; the best year netting better than $18,000.

From the primary settling tanks, the sewage flows by gravity to the mechanical flocculation tanks; three units, each 33 ft. wide by 8 ft. liquid depth by 55 ft. long with motor-driven paddle-type agitators. These units provide a 45-minute detention at 10 MGD rate.

From the flocculation units the sewage flows by gravity to intermediate settling tanks. These three settling units are 33 feet wide by 8 ft. liquid depth by 110 ft. long equipped with sludge collectors, cross-collectors, skimming and scum removal equipment. Weir length 540 ft. which at 10 MGD gives rate over weirs of .019 million gallons per foot per day. Settling rate at 10 MGD equal to 920 gallons per square foot of tank area. Detention period at 10 MGD - 1.5 hours.

From the intermediate settling tanks the sewage flows by gravity to wet well #2 and then to intermediate sewage pumps two 10 MGD and one 5 MGD motor-drive horizontal pumps located below sewage level for continuous prime. All effluent of the intermediate settling tanks over a range of 10 MGD can be pumped to a storage unit and applied to the filters when the normal flow falls below a 10 mgd rate, thereby leveling off the plant flows over a 24-hour period. This was done when the conditions of the Mississippi River require additional treatment, but after the anaerobic pond was put in service intermediate effluent in excess of 15 MGD is bypassed directly to wet well No. 3 and then pumped directly to the anaerobic pond.

From wet well #2 the sewage is normally pumped by the above-mentioned pumps to six primary filters. Each filter is 113 ft. inside wall diameter with average rock depth of 6 feet with a total rock area of 1.26 acres. The filters are designed for backwashing.

Backwashing is accomplished by flowing approximately 450,000 gallons per filter of plant effluent upward into the filter from the bottom through the tile channels, along with simultaneous air wash. The waste backwash water flows by gravity to the lower section of storage unit and at night it is fed back into the plant along with the raw sewage. Backwashing has been done at intervals of from 4 to 6 weeks depending on operating conditions.

The filters are not equipped with doing tanks. Intermediate effluent is pumped directly to the rotary distributors.

Since backwashing of trickling filters is not a common procedure, it may be worthwhile to discuss this process in more detail. For backwashing, as previously stated, 450,000 gallons of plant effluent is used for each filter. The wash water is not pumped directly into the filters, but instead is pumped to an elevated storage tank of 475,000 gallon capacity.

During backwashing, the elevated tank is allowed to empty very rapidly through a 48 in. concrete conduit. The flow through the filters is at the rate of 15,000 gal. per min. with a hydrostatic pressure at the base of the filter of 6.3 to 4.7 pounds. To aid in backwashing, a grid of air lines with orifices spaced 18 in. from center to center was placed 7 in. above the bottom of the filter rock. To furnish air for this aeration system a blower delivering 6,500 cu. ft. per minute is used. It delivers 3 lbs. pressure at the discharge of blower.

From the filters the sewage flows by gravity to final settling tanks, which are the same design as intermediate tanks with the same type of sludge and scum collection and the same detention period (1.5 hours).

The sewage then flows by gravity to the Mississippi River or during high river stage to wet well #3 and then to the river by pumping. However, with the anaerobic pond, now the sewage from the final tank all flows to wet well #3 and it is then pumped into the pond and from the pond the sewage flows by gravity through a parshall flume meter to the Mississippi River. This pumping adds considerably to the cost of treatment but could not be avoided due to the relative elevation of the intercepting sewer and treatment plant. Chlorination is provided for with two machines, both manual, which can deliver chlorine at three points in the plant.

The average sewage flow for killing days (killing days are the days the packing plants are killing) during the past ten years (1957-58 to 1967-68) was 12.9 million gal. per day. On Sundays and holidays it was only 7.410 million per day. Weir studies indicated that approximately 84 percent of the sewage flow on week days is industrial waste from the packing industries and the Stockyards Company, the city domestic flow contributing about 16 percent of the total flow.

All data subsequently reported is based on 24 hourly samples composited according to flow, and for the pond effluent, samples are taken every four hours and composited to flow of the pond effluent meter.

BOD

On killing days, the BOD of the raw sewage for the last ten years averaged 1,289 PPM with a peak monthly average of 1,957 and a low of 817 PPM.

The BOD of the plant effluent for week days has averaged 395 PPM including the pond. This represents an overall reduction of 69.4 percent. Using only killing days, with an average flow of 12.90 MGD, the average daily removal of BOD was 96,000 pounds. Because of the heavy loading of paunch manure, it is possible to remove 12.3 percent of the raw sewage BOD in the primary tanks which also serve as grit removal chambers and an additional 25.3 percent in the mechanical flocculators and intermediate settling tanks. Thus, approximately 37.6 percent of the total reduction of 69.4 percent is accomplished by primary and intermediate sedimentation. The trickling filters remove more BOD than might be expected, for the sewage going on the filters has an average BOD of 807 PPM. Of this, 412 PPM are removed by the filters, the final settling tanks, and the pond, which is 51.1 percent of the applied BOD. These figures being ten-year averages do not show up the effect of the pond. During 1966 it became necessary to take the pond out of service for several months for the construction of the flood control dike on the Mississippi River. However, since the pond became operational in July, 1963, the overall plant removal of BOD for those months which the plant has been in full service averaged 85.7%. This is calculated on the basis of pounds of BOD flowing into the plant and pounds of BOD flowing out of the plant.

Settleable Solids

As might well be expected of a plant with trickling filters, practically all the settleable solids are removed. Of the raw average of 16.0 ml per L. of settleable solids 15.1 ml per L. are removed. This represents an overall removal of 94.2 percent. The settleable solids in the pond effluent fluctuates over a wide range from 6.2 ml. per L. in the maximum single day to less than .1 ml. per L. with an average for the month which the pond has been in service of .8 ml per liter. There appears to be a spring and fall turnover.

Suspended Solids

Of the 902 PPM of suspended solids entering the plant 802 PPM were removed. This gave an overall removal of 88.9 percent. Of this, 29.7 percent was removed by the grit chambers, 38.8 percent by the primary sedimentation tanks, with 20.5 percent removed by the trickling filter, final sedimentation tanks and pond.

The high percentage of removal by the grit chambers and primary sedimentation tanks is attributed to the nature of the sewage. The raw sewage has enough heavy organic material in suspension so that when it becomes quiescent in the grit chambers and in the primary sedimentation tanks, this material quickly settles out; removing the suspended solids nearly as effectively as a chemically produced floc.

The operation and maintenance of the plant is under the direction of a three-man Sewage Disposal Commission created by Ordinance and appointed by the City Council. The annual operating budget is approximately $160,000. Ninety percent of this is paid by the industries and the remaining 10 percent by the city. This is in accord with a 15-year agreement entered into by the industries and the city. The city's 10% is raised by a sewage rental charge, which originally was established as 30 percent of the amount of water bills for the quarter ending March 31 of the previous year; this 30 percent has since been reduced to a 15 percent charge. The operating personnel consists of an operator and a helper on each of three shifts and two relief men, a maintenance operator, three laborers on the day shift, chemist and superintendent.

Every precaution is taken to safeguard the health and life of plant personnel. All have been inoculated against typhoid and paratyphoid A and B. Safety equipment is provided in the nature of carbon monoxide detector, hydrogen sulfide detector, Wolf Safety Lamp for detection of oxygen deficiency, two all-purpose gas masks, one chlorine gas mask, safety helmets, dust respirators, goggles, safety harness (for lowering men into hazardous areas) and complete first-aid equipment.

In 1962, State river standards were revised to provide for a minimum of 2 mg/l dissolved oxygen in the Mississippi

River in the reach of the river from the Minneapolis-St. Paul Sanitary District outfall to the Hastings Dam. Reaeration studies indicated that in order to meet these standards, it would be necessary for the Minneapolis-St. Paul Sanitary District and the South St. Paul Sewage Treatment Plant effluents to have a BOD of no greater than 65 mg/l. Later in 1966 a study of the river by the Federal Water Pollution Control Administration resulted in a recommendation that standards be set at 68,500 lbs. BOD per day from all sources for this reach of the river and that the effluent standards be reduced to 50 mg/l. Even though treatment at the South St. Paul plant effected a reduction in BOD of greater than 90 percent for the critical summer months the effluent still had a BOD of about 100 mg/l. It was necessary, therefore, to increase the treatment to obtain a reduction in the order of 95 percent. After several engineering studies and considerable consultation between the city and industries, the City of South St. Paul engaged the firm of Greeley and Hansen and Banister Engineering to design and to engineer the expansion of the South St. Paul Sewage Treatment Plant and the interceptor sewer. This work was to proceed in three phases. Phase one would consist of a plant-scale project to determine the effectiveness of the use of polyelectrolytes as a means of chemical flocculation along with the construction of additional plant facilities necessary for the study. In addition, improvements are being made to present facilities. Phase two would consist of further construction if necessary to provide for the treatment necessary to meet the standards. Phase three would provide for sludge disposal.

Application for a Federal demonstration grant was made to study chemical flocculation using the Blaisdell and Klaas method, which employs a weighting agent to decrease the sedimentation time. If the use of the polyelectrolytes proves effective and feasible, it could provide an economic means of increasing the level of treatment in many plants of other cities which are presently overloaded.

The additional facilities being constructed are of such a nature that most of the facilities could be used for plant-scale chemical treatment if that becomes feasible or be incorporated in conventional treatment if the tests indicate that it is not practical to use chemicals.

The construction of added facilities in phase one will consist of: construction of another 48" interceptor to bring the industrial wastes to the plant separately; an industrial lift station to pump Swift's sewage into the new interceptor; an industrial pumping station at the plant having a capacity of 33 MGD to pump the raw industrial wastewater; a parshall flume meter to measure the rate of flow of the industrial wastewater; new grit chambers, which will provide continued separation of industrial and domestic waste; and a new chemical building which will provide storage, housing for mixing equipment and controlled equipment for the addition of chemicals.

The city and stockyards sewage will be conveyed to the plant in the present interceptor and be pumped to the new grit chambers by the present pumping station.

During testing and/or ultimate chemical treatment the grit chamber effluent, after being mixed with chemicals, will pass into the mechanical flocculators which provide additional gentle agitation. The flow design provides for splitting the sewage to be tested and passing half of it which has been treated chemically through one settling tank. The other untreated half will be passed through a second settling tank as a control. Excess sewage not being tested can be passed through the third tank. The design provides for testing either the industrial or domestic sewage separately or testing a mixture of them and allows for metered variation of flow through the test tanks providing for different retention times.

In addition to the above-mentioned new facilities, the present grit chambers will be enlarged and converted to a chlorine contact tank. New four-arm distributors will be installed on the filters and new pumps with additional pumping capacity will be provided. With this added pumping capacity all of the sewage could then be passed through the filter before going to the anaerobic stabilization pond.

To carry out the Federally-funded demonstration project it was necessary to hire additional personnel. These included a second full-time chemist, one person full-time for secretarial and lab technician work, and a lab technician who will later work one shift as a chemical technician in carrying out the plant scale tests. In addition, it will be necessary to hire one more man to provide a person for a second shift in the operation of chemical equipment in plant-scale tests.

In connection with the Federal demonstration a number of new tests were initiated at the South St. Paul Sewage Treatment Plant laboratory. While the immediate purpose of these tests was to establish background data for the project, they also provide the plant with data on additional parameters which indicate the effectiveness of the treatment process. Among the tests being run those which provide useful data are: volatile solids, total and suspended; coliform MPN, total and fecal; total phosphate determination; total Kjeldahl nitrogen and chemical oxygen demands. The suspended volatile solids tests indicate an average reduction of 93.7 percent.

Coliform MPN determination are run using the 5-tube multiple tube technique. Results of these indicate a reduction of 93.4 percent in total coliform and 92 percent in fecal coliform. Most of this reduction takes place in the stabilization pond as a result of the natural die-off rate of these bacteria with very little reduction occurring in primary and secondary treatment units.

Phosphate tests indicate an average concentration of 41.5 PPM in the raw and 29.8 PPM in the effluent; a reduction of 28.2 percent.

Chemical oxygen demand tests show the average COD of the raw sewage to be 2,646 PPM with the effluent having 596 PPM; a reduction of 77.4 percent.

Total nitrogen tests have only recently been initiated and the results are not necessarily indicative of what will occur throughout the year. Nitrogen tests run to date, however, indicate raw sewage contains 100.8 PPM of total nitrogen and the effluent contains 65.9, a reduction of 34.7 percent.

Additional tests are being run to determine the characteristics of the various sludges produced at this plant.

FINANCIAL STATEMENT

FISCAL YEAR ENDING MARCH 31, 1968

SEWAGE DISPOSAL COMMISSION

SOUTH SAINT PAUL, MINNESOTA

For operation and maintainance of Sewage Treatment Plant

Balance on Hand March 31, 1967		$ 18,190.60
Revenue		
Collections	$167,624.69	
Sales (grease, sludge, scrap)	6,552.04	
Refunds & Reimbursements	1,410.29	
	$175,587.02	$175,587.02
		$193,777.62
Expenditures		
Salaries	112,063.84	
Light & Power	22,416.48	
Repairs & Replacements	12,665.69	
Materials & Supplies	4,035.98	
Insurance	1,195.45	
Gas - Grease - Oil	358.45	
Other Operative Expenses	1,144.21	
Telephone	181.81	
Other Administrative Exp.	695.25	
Deod. Expenses		
Federal Research Project	18,190.69	
Total Expenditures	172,947.85	$172,947.85
Federal Expenditure Refundable		18,190.69
Total Operating Cost		$154,757.16
Balance on Hand March 31, 1968		
Cash	2,829.77	
Certificates of Deposit	18,000.00	
	$ 20,829.77	$ 20,829.77

PLANT OPERATION

5 DAY BOD IN PPM FOR WEEK DAYS

AVERAGES OF 24 HOUR COMPOSITES

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	1000 # RAW***	1000 # POND EFF	% Red. ****
April	1305	1123	857	483	163	137.0*	17.4	87.4
May	1085	936	707	416	93	108.4	8.34	92.2
June	1031	958	626	365	89	117.5	9.37	92.1
July	909	853	540	361	93	119.7	10.5	91.5
Aug.	1027	875	628	359	110	131.0	12.2	90.6
Sept.	1085	905	586	387	105	126.0	10.5	91.7
Oct.	1155	1046	761	436	147	147.5**	20.4**	86.1*
Nov.	1366	1166	852	545	162	168.4	17.5	89.5
Dec.	1319	1272	856	608	180	141.6	16.75	88.1
Jan-68	1216	1119	779	580	233	131.1	20.1	84.6
Feb.	1152	1038	708	465	208	122.3	19.3	84.3
March	1167	907	685	432	128	119.0	11.2	90.6
Yearly Ave.	1151	1016	715	453	142	130.8	14.5	89.0

* Does not include flow or BOD from 6th Street sewer. (1.4 mgd - 250 PPM estimate)

** Plant effluent includes days pond was out.

*** Total raw BOD includes screenings at 40 lbs. BOD/bucket.

**** Based on pounds of BOD removed.

PLANT OPERATION

SUSPENDED SOLIDS IN PPM FOR WEEK DAYS

AVERAGES OF 24 HOUR COMPOSITES

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF.	% REDUCTION
April	963	583	283	131	105	89.1
May	788	558	245	120	50	93.6
June	787	530	196	109	42	94.6
July	716	474	169	113	20	95.8
August	807	435	229	106	12	98.5
Sept.	790	430	172	81	19	97.6
Oct.	816	512	192	97	23	97.3
Nov.	1006	644	257	148	64	93.6
Dec.	940	571	208	105	151	84.0
Jan-68	846	591	250	135	105	87.6
Feb.	823	565	205	116	83	89.9
March	810	479	193	117	115	85.8
Yearly Ave.	841	531	216	115	66	92.3

PLANT OPERATION

SETTLEABLE SOLIDS ML/L FOR WEEK DAYS

AVERAGES OF 24 HOUR COMPOSITES

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	% REDUCTION
April	14.9	7.8	2.1	1.0	1.6	89.4
May	15.5	7.6	1.8	1.3	.85	94.2
June	13.1	7.0	1.5	1.27	Tr	99.+
July	13.7	8.4	1.6	.53	Tr	99.+
Aug.	15.0	7.3	2.2	1.3	Tr	99.+
Sept.	14.2	6.5	.8	.5	Tr	99.+
Oct.	13.6	7.4	1.9	.82	Tr	99.+
Nov.	17.8	7.6	2.3	1.5	.83	95.5
Dec.	17.2	8.11	1.8	.96	2.65	84.9
Jan-68	13.1	8.0	2.1	1.10	1.4	89.4
Feb.	15.0	7.6	1.6	.81	1.3	91.4
March	14.5	6.6	1.1	.7	1.8	87.5
Yearly Ave.	14.8	7.5	1.7	.98	.87	93.9

PLANT OPERATION

TOTAL SOLIDS IN PPM FOR WEEK DAYS

AVERAGES OF 24 HOUR COMPOSITES

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	REMOVAL
April	2885	2474	2177	1797	1309	1576
May	2501	2236	1994	1741	1417	1084
June	2490	2237	1829	1713	1292	1198
July	2378	2166	1827	1695	1329	1049
Aug.	2515	2129	1919	1691	1334	1181
Sept.	2530	2144	1888	1704	1307	1160
Oct.	2757	2419	2127	1846	1446	1311
Nov.	2983	2593	2195	1959	1588	1395
Dec.	2986	2589	2242	2010	1644	1342
Jan-68	2824	2500	2117	1965	1517	1307
Feb.	2711	2146	2133	1891	1578	1132
March	2643	2301	2081	1872	1494	1149
Yearly Ave.	2683	2328	2044	1824	1438	1240

PLANT OPERATION

TOTAL VOLATILE SOLIDS PPM FOR WEEKDAYS

AVERAGE FOR 24 HOUR COMPOSITES

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF.	REMOVAL
July	1013	810	537	396	174	825
Aug.	1143	811	627	402	187	756
Sept.	1170	824	693	422	186	984
Oct.	1232	945	678	427	210	1022
Nov.	1446	1143	763	533	247	1199
Dec.	1345	982	670	513	277	1068
Jan-68	1398	1030	752	705	286	1112
Feb.	1215	907	667	430	247	840
March	1172	822	600	432	257	915
Yearly Ave	1237	919	665	473	230	1007
% Volatile	46.0	39.4	32.5	25.9	15.9	

PLANT OPERATION

VOLATILE SUSPENDED SOLIDS PPM FOR WEEK DAYS

AVERAGES OF 24 HOUR COMPOSITES

	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	% REDUCTION
	606	384	129	77	16	97.3
	688	368	198	83	9	98.7
	674	351	144	59	11	98.4
	704	398	161	76	17	97.5
	855	561	197	116	50	94.1
	750	440	115	63	107	85.7
	861	534	244	130	95	89.0
	702	500	160	88	50	92.9
	592	345	143	57	55	90.6
e	715	431	165	83	45	93.7
tile	85.0	81.2	76.4	72.1	68.3	

PLANT OPERATION

Coliform MPN - Total and Fecal - Weekdays

AVERAGE* FOR GRAB SAMPLES

	Total MPN X 10^6				Fecal MPN X 10^6			
1967	Plant Inf Ave	Max.	Plant Eff Ave	Max.	Plant Inf Ave	Max.	Plant Eff Ave	Max.
Sept.	69.0	79.0	4.7	33.0				
Oct.	70.0	70.0	5.6	23.0	49.0	49.0	3.9	49
Nov.	60.3	130.0	5.5	23.0	46.4	79.0	5.4	13.0
Dec.	22.1*	221	3.4	7.0	21.6*	221	3.4	70
Jan-68	56.5	70	2.9	7.9	40.2	49	2.8	4.9
Feb.	45.0	130	2.8	22.1	30.3	130	2.5	22.1
March	66.0	79.0	2.8	4.9	40.0	49	2.0	2.3
Average*	61.1		4.0		41.2		3.3	

* All extremes were excluded from average.

PLANT OPERATION

COD PPM WEEKDAYS

AVERAGE FOR 24 HOUR COMPOSITE

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	% REDUCTION
Dec.	2852	2511	1545	1575	830	70.9
Jan-68	2909	2233	1435	1467	750	74.2
Feb.	2510	1906	1295	815	459	81.7
March	2316	1721	984	768	345	85.2
Average	2646	2092	1314	1156	596	77.4

PLANT OPERATION

TOTAL PHOSPHATE PPM WEEKDAYS

AVERAGE FOR 24 HOUR COMPOSITE

1967	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF	% REDUCTION
Oct.	42.3	39.8	37.8	38.1	29.0	31.2
Nov.	45.2	37.1	35.6	34.6	29.4	34.9
Dec.	41.7	38.8	36.2	31.2	27.5	34.0
Jan-68	41.0	35.7	34.5	32.5	35.7	12.8
Feb.	41.5	30.2	33.7	34.2	26.9	35.1
March	37.3	35.9	36.5	34.2	30.3	18.7
Average	41.5	36.2	35.7	34.1	29.8	28.2

FLOWS AND POPULATION EQUIVALENTS

YEARLY AVERAGES

Year	Flow Killing Days	Pop. Equivalents	Flow Sunday-Holiday	Pop. Equivalents
1943-1944	8.91	541,000	5.86	87,300
1944-1945	9.90	422,000	6.24	45,700
1945-1946	9.81	455,000	5.17	37,900
1946-1947	8.71	433,000	4.65	44,800
1947-1948	10.19	495,000	6.24	89,500
1948-1949	10.03	575,000	5.64	127,200
1949-1950	10.62	623,000	5.90	103,700
1950-1951	10.76	611,000	5.92	106,500
1951-1952	11.06	666,000	6.39	113,000
1952-1953	11.19	668,000	6.42	84,000
1953-1954	11.93	631,000	7.52	53,000
1954-1955	10.99	598,000	6.59	50,000
1955-1956	10.67	718,000	6.17	64,000
1956-1957	10.46	578,000	6.29	58,000
1957-1958	10.85	684,000	6.72	44,000
1958-1959	10.75	681,000	6.18	44,000
1959-1960	11.54	812,000	6.87	77,000
1960-1961	12.02	841,000	6.74	63,000
1961-1962	12.74	788,000	6.63	47,000
1962-1963	13.04	818,000	6.94	54,000
1963-1964	14.17	917,000	8.06	84,000
1964-1965	14.66	880,000	8.82	105,000
1965-1966	13.63	805,000	9.23	56,700
1966-1967	13.02	667,000	7.26	46,300
1967-1968	13.35	754,000	7.31	53,400
Ten Year Average 1958-1968	12.90	816,000	7.41	62,640
Twenty Five Year Average 1943-1968	11.36	664,000	6.63	69,600

POPULATION EQUIVALENTS

WEEK DAYS

1967	Flow MGD Average	BOD Raw Sewage Ave.	Pop. Equivalent Averages
April	12.38*	1305	793,000
May	11.74	1085	625,000
June	13.40	1031	678,000
July	15.51	909	693,000
August	14.96	1027	753,000
Sept.	13.65	1085	726,000
Oct.	14.82	1155	839,000
Nov.	14.47	1366	969,000
Dec.	12.46	1319	805,000
Jan-68	12.40	1216	739,000
Feb.	12.41	1152	702,000
March	11.97	1167	685,000
Yearly Ave.	13.35	1151	754,000

SUNDAYS & HOLIDAYS

Yearly Ave.	7.31	149	53,400

Based on standards of 0.17 pounds of 5 day BOD per capita.

* Does not include flow or BOD from 6th St. sewer (1.4 mgd - 250 PPM estimate)

SOUTH ST. PAUL SEWAGE TREATMENT PLANT

BOD

YEARLY AVERAGES WEEKDAYS

YEAR	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF.	% REDUCTION
1943-1944	1192	1085	741	417		65.0
1944-1945	1026	842	618	297		70.3
1945-1946	951	751	527	205		78.4
1946-1947	1018	806	510	195		80.8
1947-1948	990	809	548	280		71.8
1948-1949	1176	909	651	355		69.0
1949-1950	1205	935	640	376		68.8
1950-1951	1152	935	625	351		69.4
1951-1952	1231	1054	669	391		68.2
1952-1953	1184	977	692	428		63.8
1953-1954	1077	936	674	433		59.8
1954-1955	1108	930	735	412		62.8
1955-1956	1364	1140	912	521		61.3
1956-1957	1127	953	724	432		61.6
1957-1958	1286	1048	779	509		60.4
1958-1959	1294	1102	785	442		65.8
1959-1960	1431	1245	806	462		67.7
1960-1961	1423	1226	843	465		67.2
1961-1962	1337	1189	823	432		67.7
1962-1963	1356	1206	809	491		63.8
1963-1964	1394	1244	884	582	322	76.8*
1964-1965	1298	1108	873	564	272	79.1*
1965-1966	1169	1019	744	473	205**	82.5*
	- -				(327)	(72.1)
1966-1967	1041	948	785	480	301**	71.1*
					(344)	(66.9)
1967-1968	1151	1016	715	453	142	87.5
Ten Year Average						
1958-1968	1289	1130	807	484		62.5
				(395)		(69.4)
Twenty five Year Average						
1943-1968	1199	1016	724	417		65.2
				(382)		(68.2)

( ) Effluent to river

* Does not include reduction caused by reduced effluent flow because of evaporation and leaching.

** Pond in service for six months or less

SUSPENDED SOLIDS

YEARLY AVERAGES FOR WEEKDAYS

YEAR	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF.	% REDUCTION
1943-1944	1000	506	134	52		94.8
1944-1945	869	362	129	58		93.3
1945-1946	714	356	141	42		94.1
1946-1947	760	456	147	55		92.8
1947-1948	776	418	161	80		89.6
1948-1949	831	424	151	91		89.0
1949-1950	780	433	168	93		88.1
1950-1951	783	428	177	89		88.6
1951-1952	738	431	179	82		88.9
1952-1953	861	550	261	106		87.6
1953-1954	1041	691	276	141		86.4
1954-1955	1016	686	350	139		86.3
1955-1956	1298	859	437	172		87.0
1956-1957	1096	768	325	135		87.1
1957-1958	957	691	299	146		87.7
1958-1959	1004	657	289	116		88.3
1959-1960	898	715	258	138		86.2
1960-1961	910	681	295	118		87.1
1961-1962	896	643	289	114		87.3
1962-1963	908	684	307	136		85.1
1963-1964	911	699	347	185	80	91.2*
1964-1965	855	617	362	215	92	89.3*
1965-1966	967	594	246	122	72**	92.5*
					(94)	(90.3)
1966-1967	836	539	243	131	100**	88.1*
					(99)	(88.2)
1967-1968	841	531	216	115	66	(92.3)
Ten Year Average						
1958-1968	902	635	285	140		84.5
Twenty Five Year Average				(100)		(88.9)
1943-1968	901	516	238	114		88.3
				(102)		(88.7)

( ) Effluent to river

* With pond effluent

** Pond in service for six months or less

SETTLEABLE SOLIDS ML/L

YEARLY AVERAGES FOR WEEKDAYS

YEAR	RAW	GRITS EFF	PRIMARY EFF	FINAL EFF	POND EFF.	% REDUCTION
1943-1944	12.5	4.8	.8	.25		98.0
1944-1945	11.1	2.8	.3	.25		97.7
1945-1946	11.4	2.6	.3	.15		98.7
1946-1947	11.9	3.2	.4	.22		98.2
1947-1948	15.3	4.2	.5	.27		98.3
1948-1949	16.9	4.5	.5	.27		98.5
1949-1950	15.9	5.1	.6	.30		98.0
1950-1951	15.2	4.3	.9	.29		98.4
1951-1952	14.1	5.3	1.0	.29		98.0
1952-1953	17.0	6.6	1.0	.38		97.7
1953-1954	19.8	8.1	1.6	.47		97.6
1954-1955	19.5	7.9	4.1	.69		96.3
1955-1956	22.8	10.4	4.7	1.35		94.2
1956-1957	19.1	8.2	1.8	.76		96.4
1957-1958	18.4	7.7	2.0	.96		94.0
1958-1959	18.2	7.4	1.6	.90		95.1
1959-1960	18.7	9.3	2.3	1.14		93.9
1960-1961	17.0	7.9	1.7	.96		94.0
1961-1962	15.9	7.0	1.5	.86		94.4
1962-1963	15.5	7.6	1.9	1.00		93.6
1963-1964	16.3	8.6	2.8	1.40	.55	96.4*
1964-1965	15.2	7.9	3.7	2.20	1.02	93.5*
1965-1966	15.3	7.2	1.8	1.19	.95** (1.06)	93.8* (93.2)
1966-1967	14.9	7.9	2.2	1.5	1.2** (1.2)	92.0* (92.0)
1967-1968	14.8	7.5	1.7	.98	.87	93.9
Ten Year Average 1958-1968	16.0	7.9	2.1	1.21 (.94)		92.4 (94.2)
Twenty Five Year Average 1943-1968	16.1	6.5	1.7	.74 (.62)		95.4 (96.3)

( ) Plant effluent to river

* With pond effluent

** Pond in service for six months or less

SOUTH ST. PAUL SEWAGE TREATMENT PLANT

COST ANALYSIS FOR YEAR 1967-68

YEAR 1967	MONTHLY COST OF OPERATION*	M. G. OF FLOW	COST PER M. G.	COST OF ELECTRICITY PER M.G.
April	$ 11,335.21	297	$33.17	$ 5.95
May	13,264.97	293	45.27	6.63
June	12,779.11	329	38.84	5.11
July	14,562.11	362	40.22	4.72
Aug.	15,186.75	404	37.59	4.34
Sept.	11,631.03	296	39.29	6.44
Oct.	10,980.85	374	29.36	4.90
Nov.	15,185.89	335	45.33	4.90
Dec.	11,994.92	263	45.61	7.60
Jan. '68	13,224.17	304	43.50	6.22
Feb.	11,896.00	284	41.89	7.65
March	12,716.15	277	45.90	7.82
Total	154,757.16	3818	40.53	5.87

*Excludes Federal Project.

ANALYTICAL DATA

AVERAGE OF THE TEN YEAR PERIOD ENDING MARCH 31, 1968

(Killing Days)

	Raw Sewage	Grits Eff	Primary Eff	Final Eff	1966 to '68 Pond Eff	% Reduction
Suspended Solids PPM	902	635	285	140 (100)	83	90.7* (88.9)
Settleable Solids ML/L	16.0	7.9	2.1	1.21 (.94)	1.03	92.8* (93.9)
5 Day BOD PPM	1289	1130	807	484 (395)	221	82.8* (69.3)

Population Equivalent 816,000

Flow MGD 12.90

ANALYTICAL DATA

AVERAGE OF THE TEN YEAR PERIOD ENDING MARCH 31, 1968

(Sundays & Holidays)

	Raw Sewage	Grits Eff	Primary Eff	Final Eff	1966 to '68 Pond Eff	% Reduction
Suspended Solids PPM	154	102	52	39	62	74.7
Settleable Solids ML/L	3.05	1.88	.32	.19	.72	93.8
5 Day BOD PPM	176	179	134	95	172	46.1

Flow MGD 7.41

Population Equivalent 62,640

* With pond

( ) Effluent to river.)

MR. PETERSON: Thank you.

MR. STEIN: Thank you.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much for a very complete statement on the City of South St. Paul's program.

Mr. Badalich?

MR. BADALICH: Mr. Chairman, I have a statement here from Mr. Dean E. Abrahamson that he would like to have submitted for the record.

MR. STEIN: Without objection, that will be entered into the record as if read.

(The statement of Mr. Abrahamson is as follows:

DEAN E. ABRAHAMSON
1092 25 AVE. S.E. MINNEAPOLIS, MINN. 55414

30 April 1968

Mr. Murray Stein
Federal Water Pollution Administration
Hotel Leamington
Minneapolis, Minnesota

Dear Mr. Stein:

As my schedule does not permit me to stay at the joint Federal-State conference today, I respectfully request that this statement be accepted and read into the record.

In summary, I indicate in the statement the extreme importance of careful and complete consideration of pollution from nuclear generating plants. Both the thermal and radioactive pollutants potentially available from these facilities are extremely dangerous. I also urge that the Federal Water Pollution Control Administration join with the Minnesota Pollution Control Agency in its efforts to secure expert assistance in determining standards for the discharge of radioactive pollutants.

For the record, my address is given above; and my professional qualifications are: B.S. and M.A. degrees in physics and mathematics; employment experience as First Assistant in Physics at the Royal Institute of Technology in Stockholm, Sweden, as Reactor Physicist with the Babcock and Wilcox Co., Reactor Division in Lynchburg, Virginia, and as Senior Scientist with Honeywell in Minneapolis; the Ph.D. degree in anatomical science with minor in physics; and the degree of Doctor of Medicine. Currently I am Assistant Professor in the College of Medical Science at the University of Minnesota.

I make this statement as an interested citizen, and do not claim the support of any organization with which I am associated.

Sincerely yours

/s/ Dean E. Abrahamson

D. E. Abrahamson

Dean E. Abrahamson, M.D., Ph.D.

cc: file

dea

* * *

STATEMENT OF DEAN E. ABRAHAMSON TO THE JOINT
FEDERAL-STATE WATER POLLUTION CONFERENCE AT
MINNEAPOLIS, MINNESOTA 30 APRIL 1968

The rapidly growing nuclear power industry makes necessary a detailed evaluation of the potential thermal and radioactive pollution from nuclear generating plants. There are three major nuclear power plants under contract for Minnesota at present, and no doubt many more are under consideration. The ecological impacts of this situation are immense, particularly because these plants are located at the headwaters of one of the world's greatest rivers wherein almost insignificant environmental changes or unbalances can potentially affect the entire central portion of the United States. In addition, the radioactive contamination which might be introduced by these plants would be cumulative in its effects, particularly those involving the genetic abnormalities which it would induce.

The destructive capability of thermal pollution has long been recognized, and temperature limits are included in the State and Federal water quality criteria. The advent of nuclear power, however, makes the problem of thermal pollution even more critical than it has been in the past. Because of their lower efficiency a nuclear power generating plant must dispose of considerably more waste heat than would a conventional power plant of equal electrical capacity. Further it is anticipated that demands for electrical power will double in each ten years.

It has recently been reported that the Vermont Yankee nuclear generating plant will be operated with cooling towers such as to cause no increase in river water temperature during the summer, and less than four degrees during the balance of the year. As the Vermont Yankee plant is substantially the same size as the plants proposed by the Northern States Power Company for Minnesota, and as the climatic conditions are very similar in Vermont and in Minnesota, it would appear that the Monticello plant, as well as the others proposed for Minnesota, could comply with the same temperature standards as will the Vermont Yankee plant. Control of thermal pollution should be equally desirable for Minnesota as it is for Vermont. Likewise the increase in power cost, reported at approximately one percent, is no more for Minnesota consumers than it is for those in other States.

In the field of radioactive wastes, a unique opportunity exists to control a source of pollution from the onset rather than coping with air and streams already severely burdened as is the case with other pollutants. The situation regarding radioactive waste has been confused by the assertion that the Atomic Energy Commission (AEC) has exclusive jurisdiction. The AEC does have interest in two areas: 1) the promotion and development of nuclear power and 2) the review and control of those features of a nuclear power facility which render very improbable a major accident. This must not, however, be construed to mean that the State of Minnesota does not have the obligation to regulate both thermal and radioactive waste disposal from nuclear generating plants. The Atomic Energy Act of 1954 included a preemption statement explicitly stating that the intent of the act was to remove control of radiation hazards from the States and give them to the AEC. The 1959 amendment to this act deleted the preemption statement, apparently because of concern about its constitutionality in abrogating the fundamental right of the States to control the health, safety and welfare of their citizens.

Radioactive wastes could well prove to be the most devastating of all pollutants. The quantities of these wastes are large. It has been shown, for example, that the total radioactive discharges in the liquid effluent from the Monticello reactor could be several thousand times the quantity indicated by the operator of that facility. The dangers associated with the discharges of radioactive waste cannot be overemphasized; yet it has been proposed that they be deliberately released into the environment at each reactor site. As with thermal waste, the technology exists to collect and dispose of off-site these radioactive wastes. The costs involved in the control of these wastes are not expected to be large.

It is essential that the power industry, and every other industry and municipality, consider the responsible disposal of its wastes as part of normal operation. The practice of dumping any and all wastes into the nearest public waterway has reduced many of our surface waters to "open sewers." Waste disposal is as much an expense of generating power as is distribution of the power to the customer or as is proclaiming via the advertising media the virtues of electrical power. It must not be considered as a "penalty" imposed upon one segument of the industrial community.

The Minnesota Pollution Control Agency is currently seeking expert assistance regarding the standards which Minnesota should impose concerning radioactive wastes from the growing nuclear generating facilities. I urge the Federal Water Pollution Control Administration to join in the effort to assure a comprehensive and complete analysis of this problem in Minnesota and throughout the United States. It is in this way that there would be a guarantee that all aspects of the public welfare would receive the same zealous attention given to the promotion of nuclear power.

Respectfully submitted by

/s/ Dean E. Abrahamson

Dean E. Abrahamson, M.D., Ph.D.)

* * *

MR. STEIN: Do you have anything further, Mr. Badalich?

MR. BADALICH: Yes, I do. I have a lengthy presentation by the Minneapolis-St. Paul Sanitary District that perhaps we can defer until after lunch.

MR. STEIN: Yes. We will stand recessed for lunch until quarter after one.

(Whereupon, at 12:00 o'clock noon, a luncheon recess was taken.)

Northern States Power Company

AFTERNOON SESSION

(1:15 p.m.)

MR. STEIN: May we reconvene?

Mr. Badalich?

MR. BADALICH: Mr. Stein, I would like to submit a letter and statement from the Northern States Power Company for the record.

MR. STEIN: That will be entered into the record as if read.

(The statement of the Northern States Power Company is as follows:

NSP
NORTHERN STATES POWER COMPANY
414 NICOLLET MALL
Minneapolis, Minnesota 55401

LAW DEPARTMENT
Donald E. Nelson
Vice President and
General Counsel
Wm. S. Hooper
Arthur R. Renquist
Arland D. Brusven
Gene R. Sommers
Ralph S. Towler

Telephone 330-6600
Area Code 612

Northern States Power Company

Warren E. Blaisdell

David G. McGannon

Attorneys

April 25, 1968

Mr. John P. Badalich

Executive Secretary and

Chief Executive Officer

Minnesota Pollution Control Agency

University of Minnesota Campus

459 State Board of Health Bldg.

Minneapolis, Minnesota 55440

Dear Mr. Badalich:

We request that you present to the Conferees at the Progress Evaluation Meeting of the Federal-State Enforcement Conference on April 30, 1968, the enclosed written statement of Northern States Power Company. This statement presents information relating to NSP's compliance with recommendations of the Conference contained in the Summary of Conference (Second Session).

Very truly yours,

/s/ A. R. Renquist

A. R. RENQUIST

ARR: pd

Enclosure

* * *

Northern States Power Company

STATEMENT OF
NORTHERN STATES POWER COMPANY
PROGRESS EVALUATION MEETING OF FEDERAL-STATE ENFORCEMENT CONFERENCE

Steam generating plants owned and operated by Northern States Power Company (NSP) and considered in the Summary of Pollution Abatement Recommendations of the Federal Water Pollution Control Administration for the Upper Mississippi River and major tributaries are as follows:

(1) Riverside Power Plant located in Minneapolis on the Mississippi River at river mile 856.9;

(2) High Bridge Power Plant located in St. Paul on the Mississippi River at river mile 840.5;

(3) Red Wing Power Plant located in Red Wing on the Mississippi River at river mile 789.4;

(4) Wilmarth Power Plant located in Mankato on the Minnesota River at river mile 104.2; and

(5) Black Dog Power Plant located in the Village of Burnsville on the Minnesota River at river mile 8.4.

These five power plants discharge condenser cooling water into rivers which fall within the scope of the conference.

Northern States Power Company

In compliance with Specific Recommendation No. 26 of the Summary of Conference (Second Session), NSP utilized the 600 acre cooling pond at its Black Dog Plant to the fullest extent between May and October 1967, inclusive. Our calculations show that during this period the thermal additions to the Minnesota River did not exceed 13.5 billion BU/day. We have now installed temperature recording instrumentation at the point of discharge to the river which will enable NSP in the future to directly measure such heated discharges to the river.

NSP has evaluated its operations at the five power plants named above and concluded that discharges to the river comply with the general recommendations of the Summary of Conference (Second Session). Detailed evaluation reports showing such compliance were filed with the Minnesota Pollution Control Agency in August and September, 1967. These reports were based on river temperature and flow criteria as set forth in such recommendations.

Pursuant to discussions with the staff of the Minnesota Pollution Control Agency, NSP has installed necessary instrumentation at all plants and established procedures for monthly effluent reports as required by the Summary of Conference. These reports are now being filed with the State agency. NSP also filed with said agency in September 1967 a summary report of liquid storage at all such plants for evaluation as to accidental spillage which may cause water pollution.

Subsequent to the Second Session of the Conference, NSP has commenced operations of its new Allen S. King Plant located in the Village of Oak Park Heights on the St. Croix River. This plant is equipped with cooling towers which will be operated to control the temperature of cooling water discharges so as not to exceed 86 degrees Fahrenheit. Operations of the King Plant will comply with applicable recommendations of the Summary of Conference.

Dated April 30, 1968 /s/ L. O. Mayer

General Superintendent

Power Production)

* * *

MR. STEIN: Mr. Badalich?

MR. BADALICH: Mr. Chairman, I have two other letters that I would like to have read into the record. One is from the City of Mankato, from Mr. William A. Bassett, City Manager, dated March 11, 1968, addressed to myself, and reads:

"As we have previously explained in the telephone conversation with Lyle Smith of your office, the communication of September 29, 1967, from your office to the City requesting certain information was apparently lost. We are happy to comply with your request for operating data and are submitting with this letter current reports dealing with these subjects. In answer to your recommended measures for compliance we answer as follows:

1. The City does discharge inadequately treated sewage from the treatment plant but we do not discharge major quantities of raw sewage from numerous combined sanitary sewers, as our City has a separated system with all sanitary wastes flowing into the treatment plant except those of Honeymead Products Company. Our plants effluent five day B.O.D. is approximately 100 mg/1 and coliform organisms are approximately (MPN) 15,000 per 100 m.
2. Generally, in regard to the recommendations, the City is taking steps to hire a consulting firm to prepare a study of the water and sewage systems. A copy of this is enclosed. We do not feel that it is wise or desireable for the City to embark on a major construction program until the results of this study are available. We are requesting completion of this study within one year.
   a. The study we propose will not be limited to the sewage and industrial wastes originating in the City but will encompass

the entire community including the City of North Mankato.

b. On the basis of the prior statement it would be unwise and impossible for the City of Mankato to meet your proposed timetable.

c. We will request the consulting engineers who are finally hired by the City to submit program reports every three months during planning and construction periods and the City will submit regular monthly effluent reports as suggested. As previously stated the City has a separated sewage and storm sewer system. We will submit a copy of the final study to show all future plannings in this area.

d. The City of Mankato does not construct combined storm sewers, nor do we plan to.

e. The City will submit the requested reports on a monthly basis effective immediately.

The City of Mankato is generally in agreement with the recommendations of the Water Pollution Control Agency but as we have previously expressed it would be virtually impossible and certainly unwise "to start any major construction until adequate information is available for the evaluation of present and future needs of the community. Please be assured of our continued cooperation in your efforts to improve the quality of our waters and our continued efforts to comply with your proposed recommendations.

If you have any questions regarding any of these matters, please feel free to call on us at any time.

Sincerely yours,

WAB:pd William A. Bassett

Encs. City Manager"

(The reports referred to in the above letter are as follows:

December 8, 1967

TO: City Manager, Mayor & Council

RE: Recommendations for the analysis and comprehensive planning for our Water and Sanitation Departments

Dear Sirs:

In conjunction with, and supplementing the water and sanitation analysis report submitted for your consideration October 5, 1966, I present the following outline as a basis for your request of recommendations as per the Council meeting of October 9, 1967.

PHASE I

A thorough geological survey of our new well field which is a 70 acre tract of land located west of Sibley Park across the Blue Earth River. This survey should include test wells and present a comprehensive plan of development with considerations in regard to the expected total water production, location and number of wells, general well and well collection system design and the potential flood conditions of that area.
We have budgeted $9,625.00 for test wells and the planning of this project.

PHASE II

The complete analyzation and examination of our Water Distribution and Sewage Collection System with a comprehensive plan for all future requirements of design in conjunction with City growth and expansion. This planning should be closely coordinated with Urban Renewal and the projected annexation of neighboring communities and areas which are adjoining our City. To date, our department has completed a considerable amount of planning and actual construction in conjunction with the present and future requirement for the development of our Water Distribution System. However, it is possible that not all of our plans are adequate considering that demand was the predominant factor for the past. Therefore, I think it is imperative that an outside opinion should be consulted to review and coordinate a master plan for the future.

The particular procedure for the analysis and planning for our Water Distribution would include:

1. A complete field survey - the collection of data such as: present system design, pipe sizes, pressure and flow characteristics, etc.
2. Coordinating field data and processing information for electronic computation.
3. Electric Computation of system (Approximate cost of this service $3,500.00).
4. Review of the total analyzation of system and the design of a comprehensive master plan for system deficiencies and future City development.

If departmental forces were utilized in a coordinated venture with a consulting engineering firm for the process of collecting the necessary field data for this comprehensive planning, the approximate estimated engineering cost would be $6,000.00.

Out of necessity, a limited amount of planning and construction has been initiated for the future of our Sewage Collection

System. Most of the projects completed to date are somewhat inadequate and limited in design with very little consideration as part of any overall comprehensive future plan.

The basic procedure for this Sewage Collection System analyzation and planning should include the following:

1. Seasonal or periodic flow studies of existing major sewage collection or interceptor lines.
2. Coordination and analyzation of system studies for existing area deficiencies, industrial waste demands and the overall future City and area growth.
3. Comprehensive planning and preliminary design of major sewage collection trunk lines for the future requirement of our City and possible areas of annexation. (The information obtained from our Storm Sewer Survey would be utilized as part of this planning.)

The cost of this proposed comprehensive planning would vary from $8,000.00 to $9,000.00 depending on the limitations we would require insofar as outside areas designated for consideration.

PHASE III

A comprehensive study and preliminary design for the secondary treatment stage for our Sewage Treatment Plant. This planning should incorporate a 20 to 25 year basis of projection for our community expansion with a potential of adaptability for unforeseen requirements of existing industrial waste problems and future area growth.

It should be noted that our existing Primary Sewage Treating facilities are adequate in capacity at present as the basic design was 65,000 per capita. However, to date we have utilized approximately 50 percent of this design capacity and therefore, it is quite evident that our future projected plans must incorporate not only the secondary phase of treatment to meet the necessary requirements of the Pollution Control Commission, but must also be comprehensive in presenting flexibility for the future of our entire sewage treatment facilities.

The cost of this preliminary planning and design would be approximately $7,000.00.

The financing of this overall comprehensive planning would be no problem as both the Water and Sanitation Departments have surplus funds available which could be utilized for this purpose.

I would not attempt to establish priorities for any particular phase of this planning program as I am firmly convinced as experience has shown, that in several cases we have had problems for lack of comprehensive planning. Therefore, I would request your consideration to starting this proposed program by January 1, 1968.

During the past three weeks I have interviewed representatives of two consulting engineering firms and also investigated the experiences of these firms in the type of planning proposed. If the City Manager and Council, at their convenience would desire an interview with these firms it could be arranged. I trust this proposal meets with your approval and I would await your consideration.

Respectfully submitted,
W. V. Lacina, Supt.
Division of Water & Sanitation

* * * * *

RIVER TESTING

This year testing was started to see what effects processed sewage from the Sewage Treatment Plant has on the river and the condition of the river upstream from the plant.

Testing was done with a Galvanic Cell Oxygen Analyzer for Dissolved Oxygen and Temperature. For Turbidity a Direct Reading Colorimeter was used. Tests were taken from the center and both sides of the river.

Coliform Testing Equipment has been purchased and will be used on a regular testing schedule in 1968.

Results of our 1967 river testing on the following pages.

DATE: DECEMBER 4, 1967

RIVER LEVEL: above 2.6'

APPROX. RIVER LOCATION	WATER TEMP. C°	D.O.	TURB.
Minn. River above Sibley Park	0.4°	14.27	0.0
Blue Earth River Hwy. 169 Bridge			
Blue Earth River Gravel Co.	0.5°	16.2	0.0
Blue Earth River At. Park	2.0°	13.29	0.0
"A" Street Lift Station	1.0°	14.27	0.0
Rock Street	1.0°	14.27	0.0
Below Treatment Plant	1.5°	13.2	0.0
Below N.S.P. Plant	9.0°	12.3	0.0
River next to Hwy 169	2.0°	14.1	0.0

Turbidity is measured in Jackson Units.

DATE: June 23, 1967

River Level: 12.5'

APPROX. RIVER LOCATION	WATER TEMP. C°	D.O.	TURB.
Minn. River above Sibley Park	22°	5.74	55
Blue Earth River Hwy. 169 Bridge	21°	6.38	125
"A" Street Lift Station	22°	6.38	65
Rock Street	22°	6.38	65
Below Treatment Plant	22°	6.38 6.81	80 95
Rendering Plant	22°	6.38 7.23	90 100
Below N.S.P. Plant	21.5°	6.60 7.23	85 90

CITY OF MANKATO

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Air Max. / Min.	Temp. of Sewage Influent	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. Ef.
	1	P.Cl	W	24/17	60°	2,634,000		8,540	3.3 s				
	2	Cl	Calm	30/5	60	2,870,000		10,440	3.7 s				
	3	C	W-NW	23/16	62	3,180,000		11,590	5.6 s				
Lt. Snow	4	Cl	W-NW	26/8	63	3,130,000		15,840	4.0 s				
	5	Cl	W-SW	24/22	63	3,180,000		12,810	4.7 s				
Snow Storm	6	Cl	E-NE	30/21	62	3,140,000		10,980	4.4 s				
Snow	7	Cl	N-NE	21/-12	62	3,000,000		10,370	4.3 s				
	8	C	S	26/20	59	2,944,000		9,150	4.3 s				
	9	C	SW	29/4	61	3,083,000		10,370	6.4 s				
	10	C	SW	16/-5	61	3,130,000		10,370	4.8 s				
	11	P.Cl	SE	31/2	61	3,160,000		12,200	4.4 s				
	12	P.Cl	E	39/17	60	3,134,000		15,860	4.9 s				
Lt. Snow	13	P.Cl	E	32/14	61	3,116,000		15,230	4.7 s				
	14	Cl	NW	22/-12	60	3,032,000		13,420	1350/3.6 s				
	15	C	NW	34/-13	59	2,744,000		14,335	41/ s				
Lt. Snow	16	Cl	S.E	25/23	61	3,247,000		12,200	4.7 s				
	17	Cl	NW	-9/-30	59	3,160,000		11,875	4.1 s				
Snow	18	Cl	N NW	6/2	59	3,176,000		9,760	5.3 s				
	19	P.Cl	SE	16/12	59	3,211,000		9,150	4.7 s				
	20	C	SE	40/16	61	3,249,000		11,370	4.1 s				
	21	P.Cl	SE	37/36	63	3,136,000		9,760	546/4.7 s				
	22	C	SE	46/20	61	3,265,000		9,150	4.0 s				
	23	C	N-NW	26/16	60	3,520,000		13,115	6.0 s				
Rain	24	Cl	E NE	33/6	59	4,790,000		16,165	11.3 s				
	25	Cl	N-NW	33/4	59	3,540,000		14,646	946/3.9 s				
	26	C	W-NW	16/-2	58	3,440,000		14,030	4.0 s				
	27	C	N-NW	19/3	58	3,350,000		11,590	3.9 s				
	28	C	W-NW	23/14	59	3,250,000		12,410	3.7 s				
	29	P.Cl	E-SE	20/9	59	2,972,000		12,410	3.6 s				
Rain & Snow	30	Cl	S-SW	32/21	59	3,516,000		12,410	5.7 s				
	31	P.Cl	NW	24/9	59	3,234,000		10,370	4.4 s				
Ave.				24.4/9.19	60.2	3,207,700		12,054	94.3/4.643				
Max.				40/36	63	4,790,000		16,165	1356/11.33				
Min.				-9/-17	58	2,634,000		8,540	546/3.0				
		Totals				99,419,000		373,690	2836/143.43				

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH

ENERAL				B.O.D.					DIGESTER NO. 1							DI				
Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Inf.	Ef.	Cl. Res. EF.		Influent PH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas~~ Level ~~Produced~~	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced
	8,540	3.3 s						7.4	94	7.0	4.6	7.0	8,540			95	7.0	4.5	24	
	10,980	3.7 s						7.3	95	7.0	4.3	8.0	10,980			94	7.0	7.3	10	
	11,590	5.6 s						7.5	95	7.0	4.5	8.0	11,590			93	7.1	4.3		
	15,860	4.0 s						7.5	95	6.9	4.7	8.6	15,860			93	6.9	4.5		
	12,810	4.7 s						7.6	94	7.0	4.4	12.0	12,810			94	7.0	4.6		
	10,980	7.4 s						7.7	93	6.9	5.0	12.0	10,980			94	7.0	4.7		
	10,370	4.3 s						7.2	95	6.9	5.0	7.0	10,370			93	6.9	4.8		
	9,150	4.3 s						7.5	93	6.9	4.6	7.0	9,150			95	7.0	4.5		
	10,370	6.4 s						7.3	94	7.0	4.7	7.0	10,370			94	7.05	4.5		
	10,370	4.8 s						7.4	94	6.95	4.5	7.0	10,370			95	7.05	4.3		
	12,200	4.4 s						7.5	95	7.0	4.8	7.0	12,200			94	7.1	4.6		
	15,860	4.9 s						7.6	95	7.0	4.7	7.5	15,860			94	7.05	4.6		
	15,230	4.7 s						7.5	95	7.0	4.7	7.0	15,230			94	7.1	4.6		
	13,420	1350 / 3.6 s						7.3	95	7.0	4.8	7.0	13,420			94	7.1	4.6		
	14,335	41 / s						7.4	95	7.0	5.0	6.5	14,335			94	7.1	4.8		
	12,200	4.7 s						7.5	95	7.0	4.4	6.0	12,200			94	7.1	4.7		
	11,895	4.1 s						7.5	93	7.0	4.8	7.0	11,895			95	7.1	4.6		
	9,760	5.3 s						7.4	93	7.0	4.4	7.0	9,760			95	7.0	4.5		
	9,150	4.9 s						7.4	93	7.0	5.0	7.5	9,150			93	7.0	4.5		
	11,370	7.1 s						7.4	93	7.0	5.0	7.5	11,370			94	7.0	4.6		
	9,760	546 / 4.7 s						7.3	95	7.0	4.8	6.5	9,760			93	7.0	4.6		
	9,150	4.0 s						7.4	94	7.0	4.7	7.0	9,150			95	7.0	4.6		
	13,115	6.0 s						7.5	97	7.1	4.5	7.0	13,115			94	7.0	4.4		
	16,165	11.3 s						7.3	95	7.2	4.8	8.0	16,165			96	7.1	4.7		
	14,640	946 / 2.9 s						7.7	95	7.1	4.8	8.0	14,640			94	7.2	4.7		
	14,030	4.0 s						7.7	95	7.05	4.9	8.0	14,030			94	7.0	4.6		
	11,590	3.9 s						7.5	94	7.0	4.8	7.0	11,590			94	6.9	4.5		
	12,810	3.7 s						7.5	94	7.0	4.7	7.0	12,810			93	7.1	4.5		
	12,810	3.6 s						7.3	94	7.15	4.7	8.0	12,810			94	7.1	4.5		
	12,810	5.7 s						7.6	94	6.9	4.8	8.0	12,810			93	7.1	4.6		
	10,370	4.4 s						7.7	94	6.95	4.9	8.0	10,390			93	7.1	4.6		
	12,054	943 / 4.69 s						7.46	943	7.0	4.76	7.6	12,054			94	7.04	4.56		
	16,165	1356 / 11.3 s						7.7	97	7.2	5.0	12.0	16,165			96	7.2	4.8		
	8,540	546 / 3.0 s						7.2	93	6.9	4.3	6.0	8,540			93	6.9	4.3		
	373,690	3936 / 143.43											373,690							

WAGE TREATMENT PLANT
THLY OPERATION REPORT

MONTH January 1969

	DIGESTER NO. 1							DIGESTER NO. 2								
Effluent PH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Sludge Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		No. Mankato Sewage Flow G.P.D.
7.4	94	7.0	4.6	7.0	8,540			95	7.0	4.5	24					381,000
7.3	95	7.0	4.3	8.0	10,980			94	7.0	4.3	18			29,280		456,700
7.5	95	7.0	4.5	8.0	11,590			93	7.1	4.3						450,900
7.5	95	6.9	4.7	8.0	15,860			93	6.9	4.5						426,700
7.6	94	7.0	4.4	12.0	12,810			94	7.0	4.6				36,600		430,300
7.7	93	6.9	5.0	12.0	10,980			94	7.0	4.7						438,400
7.2	95	6.9	5.0	7.0	10,370			93	6.9	4.8						439,600
7.5	93	6.9	4.6	7.0	9,150			95	7.0	4.5				36,600		410,400
7.3	94	7.0	4.7	7.0	10,370			94	7.05	4.5						451,800
7.7	94	6.95	4.5	7.0	10,370			95	7.05	4.3						414,800
7.5	95	7.0	4.8	7.0	12,200			94	7.1	4.6				29,280		423,400
7.6	95	7.0	4.7	7.5	15,860			94	7.05	4.6						413,800
7.5	95	7.0	4.7	7.0	15,230			94	7.1	4.6				36,600		429,000
7.3	95	7.0	4.8	7.0	13,420			94	7.1	4.6						427,600
7.4	95	7.0	5.0	6.5	14,335			94	7.1	4.8				16,470		380,100
7.5	95	7.0	4.4	6.0	12,200			94	7.1	4.7						441,200
7.5	93	7.0	4.8	7.0	11,895			95	7.1	4.6				36,600		415,200
7.4	93	7.0	4.9	7.0	9,760			95	7.0	4.5						412,500
7.4	93	7.0	5.0	7.5	9,150			93	7.0	4.5						435,400
7.4	93	7.0	5.0	7.5	11,370			94	7.0	4.6				37,820		425,300
7.3	95	7.0	4.8	6.5	9,760			93	7.0	4.6						432,800
7.4	94	7.0	4.7	7.0	9,150			95	7.0	4.6						433,600
7.5	97	7.1	4.5	7.0	13,115			94	7.0	4.4				29,280		469,500
7.3	95	7.2	4.8	8.0	16,165			96	7.1	4.7						605,800
7.7	95	7.1	4.8	8.0	14,640			94	7.2	4.7				24,400		456,000
7.7	95	7.05	4.9	8.0	14,030			94	7.0	4.6						449,600
7.5	94	7.0	4.8	7.0	11,590			94	6.9	4.5				29,280		440,100
7.5	94	7.0	4.7	7.0	12,810			93	7.1	4.5						436,000
7.3	94	7.15	4.7	8.0	12,810			94	7.1	4.5				24,400		392,800
7.6	94	6.9	4.8	8.0	12,810			93	7.1	4.6						458,600
7.7	94	6.95	4.9	8.0	10,390			93	7.1	4.6						415,800
7.46	943	7.0	476	7.6	12,654			94	7.04	4.56				30,550		435,440
7.7	97	7.2	5.0	12.0	16,165			96	7.2	4.8				37,820		605,800
7.2	93	6.9	4.3	6.0	8,540			93	6.9	4.3				16,470		380,100
					373,690									366,610		13,498,700

	DIGESTER NO. 1									SHIFT OPERATORS Int. for Reg. Time and add overtime if any			
Date	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		RAW SLUDGE AVER. PH	Day	Afternoon	Night	Cu. Slu Th Dry Dry Fin
1	65	7.0	4.3	1'8					6.2	HARVEY	RAY	BOB	Dry
2	64	7.0	4.2	3'8					6.1	ROGER	"	MONTY	Dry
3	66	7.0	4.3	1'8					6.4	GERDY + ROGER	"	"	Fin
4	64	7.0	4.4	1'8					6.1	" "	HARV	BOB	
5	64	7.1	4.5	2'0					6.0	" "	"	"	Dry
6	68	7.0	4.5	6"					6.0	" "	"	"	Dry
7	66	6.95	4.5	6"					6.3	ROGER	"	"	Fin
8	64	6.95	4.3	3'					6.1	"	"	"	
9	72	7.05	4.3	7"					6.1	RAY	HARV + GERDY	"	Dry
10	68	6.9	4.2	1'11					6.1	"	" "	MONTY	Dry
11	66	7.0	4.4	2'4					6.2	"	ROG + "	"	Fin
12	70	7.0	4.4	2'1					6.3	"	" "	BOB	
	72	7.05	4.4	2'0					6.1	"	" "	"	Dry
	72	7.05	4.5	1'2					6.4	"	ROG	"	Dry
15	70	7.1	4.6	1'2					6.3	"	"	"	Fin
16	68	7.0	4.5	6"					6.2	GERDY	HARVEY	"	
17	64	7.05	4.5	2'4					6.3	"	ROGER	"	Lag
18	64	7.0	4.4	1'4					6.2	"	RAY	MONTY	Fin
19	64	7.0	4.5	1'4					6.1	"	"	"	
20	-	-	4.5	4'1					6.1	"	"	BOB	
21	68	6.9	4.4	1'7					6.1	"	"	"	Ha
22	68	7.0	4.4	3'0					6.1	"	"	"	To
23	68	7.0	4.3	3'0					6.2	RODGER	"	"	Com
24	70	7.15	4.6	1'2					6.2	"	"	"	
25	68	7.0	4.5	1'1					6.2	"	GERDY	"	/
26	69	7.0	4.5	11"					6.1	"	"	MONTY	[illegible]
27	68	6.9	4.4	11"					6.0	"	"	"	Ca
28	71	7.1	4.3	9"					6.0	"	"	BOB	B.O
29	70	7.1	4.3	9"					6.2	"	"	"	Sep
	72	7.0	4.4	10"					6.0	RAY	"	"	[illegible]
	70	7.0	4.5	10"					6.2	"	"	"	
Ave.	65.5	7.01	4.41						6.16				* Ve Ove
Max.	72	7.15	4.6						6.4				* Ne
Min.	64	6.9	4.2						6.0				
Totals													

1-23-63	RAW SLUDGE	
% TOTAL SOLIDS	2.46	16.5
% FIXED	17.4	69.45
% VOLATILE	82.6	30.52

A

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

Day	Afternoon	Night
HARVEY	RAY	BOB
ROGER	"	MONTY
GERDY + ROGER	"	"
" "	HARV	BOB
" "	"	"
" "	"	"
ROGER	"	"
"	"	"
RAY	HARV + GERDY	"
"	" "	MONTY
"	ROG + "	"
"	" "	BOB
"	" "	"
"	ROG	"
"	"	"
GERDY	HARVEY	"
"	ROGER	"
"	RAY	MONTY
"	"	"
"	"	BOB
"	"	"
"	"	"
RODGER	"	"
"	"	"
"	GORDY	"
"	"	MONTY
"	"	"
"	"	BOB
"	"	"
RAY	"	"
"	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To MONTHLY TEST (1-24-67)

COMPOSITE SAMPLES - INF. 8:00 A.M. - 11:00 A.M.
EFF. 12:30 P.M - 4:00 P.M
1 DIPPER OF SAMPLE PER 25,000 GAL.
FLOW: 4,790,000 G.P.D.
CLARIFIER TIME 3 HR 25 MIN.
B.O.D. - INF. 2005, EFF. 80.6 ppm, RED. 66.3 %
SED. SOLIDS - INF. 8.5 ML/L, EFF. 0.15 ML/L, RED. 98.23 %
P.H. INF. 7.4, EFF. 7.15

* HEAVY RAIN + THAWING - FLOW INCREASE OF 31.6 %
OVER PREVIOUS 5 DAYS AVERAGE
* NO. KETO INCREASE 27 %

1-23-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPER-NATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	2.46	18.65	21.61	6.46	1.33	1.12	.30	1.35	1.13	.29	.29
% FIXED	17.4	69.48	66.36	39.16	37.96	39.09	38.57	37.08	37.96	40.09	40.4
% VOLATILE	82.6	30.52	33.64	60.84	62.04	60.91	61.43	62.92	62.24	59.91	59.6

B

REMARK

1-7-67 DID NOT CLEAN
BECAUSE OFF
1-10- REC. 5 FULL CHLOR
1-12 JOHN LOCUS (30 MIN.)
1-12 BUD HOFFMASTER MA
1-13 RAY BENGE CHECKED
1-14 SHIFTED BOILER FROM
1-16 GORDON HAMMER REL
OF OPER. SHIFT. HO
MAINT., + SPARE O
1-19 SHIFTED BOILER TO

CITY GAS

294,200 CU. FT. USED

NO. MANKATO

OUR METER 13,498,700 G
THEIR " 13,128,400

CHLORINE

1-1-67	1-10-67
2 EMPTY LYONS	REC. 5 FULL
1 FULL "	
2 ON LINE	

Operator in Charge

Ralph R.

	REMARKS

Digested
mped To
th

ed No. 1
ime—Days
posal to

ed No. 2
ime- Days
posal to

ed No. 3
ime—Days
posal to

ed No. 4
ime- Days
posal to

ed No. 5
ime -days
posal to

posal to

ut

Monthly Test (1-24-67)
e Samples - Inf. 8:00 A.M. - 11:00 A.M.
Eff. 12:30 P.M - 4:00 P.M
pped Of Sample Per 25,000 Gal.
4,790,000 G P.D.
er Time 3 Hr 25 Min.
- Inf. 206.5, Eff. 80.6 ppm, Red. 66.3 %
ds - Inf. 8.5 Ml/l, Eff. 0.15 Ml/l, Red. 98.23 %
Inf. 7.4, Eff. 7.15

Rain + Thawing - Flow Increase Of 31.6 %
Previous 5 Days Average
ed Increase 27 %

#2	#1	#2	#3	#1	#2	#3	Super
om	5' Off Bottom			10' Off Bottom			natant
6.84	1.33	1.12	.30	1.35	1.13	.29	.29
39.16	37.26	39.09	38.57	37.08	37.96	40.09	40.4
60.84	62.74	60.91	61.43	62.92	62.24	59.91	59.6

10

1-7-67 Did Not Clean Grit Chambers
Because Off Snow Storm
1-10- Rec. 5 Full Chlorine Cyl. = Hawkins
1-12 John Lucus (30 Min.) Checking Pumps
1-12 Bud Heffmaster Made Reg. Safety Check
1-13 Ray Bence Checked Pressure Vessels
1-16 Shifted Boiler From Gas To Oil
1-16 Gordon Hammer Relieved Oper. Holcomb
Of Oper. Shift. Holcomb Now Relief,
Maint., & Spare Operator
1-19 Shifted Boiler To Gas

City Gas Meter

294,200 Cu. Ft. Used In January

No. Mankato Sewage Flow

Our Meter 13,494,700 Gal/Month
Their " 13,128,400 " " "

Chlorine

1-1-67	1-10-67	2-1-67
2 Empty Lyons	Rec. 5 Full Hawkins	5 - Empty Lyons
1 Full "		1 - " Hawkins
2 On Line		1 Full "
		3 On Line "

Operator in Charge
Ralph R. Rader

C

CITY OF MANKATO

SEWAGE
MONTHLY

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage Inf.	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. EF.		PH Sewage
	1	Cl	NE	17/-4	61	3,191,000		15,866	3.2 s						
	2	C	N	16/11	59	3,231,000		12,810	4.3 s						
	3	PCl	SE	35/12	60	3,298,000		17,690	3.7 s						
	4	C	NW	29/7	60	3,190,000		11,590	94 6/3.7 s						
Snow	5	Cl	NE	20/13	59	2,406,000		11,285	4.3 s						
	6	C	NE	14/-11	59	3,426,000		12,260	5.6 s						
	7	C	NW	8/3	60	3,233,000		12,816	4.1 s						
	8	PCl	NE	17/-4	60	3,244,000		9,766	4.4 s						
	9	C	SW	31/8	59	3,310,000		16,980	4.5 s						
	10	C	NW	37/27	59	3,378,000		13,420	6.2 s						
	11	C	NW	24/-8	59	3,209,000		9,760	81 6/3.5 s						
Snow	12	C	NW	20/14	59	2,890,000		10,370	4.0 s						
	13	Cl	Calm	46/26	60	3,596,000		11,590	5.1 s						
	14	PCl	E-NE	35/12	60	3,690,000		10,980	5.3 s						
Snow	15	Cl	N-NW	11/-19	59	4,019,000		10,370	-						
	16	C	W-NW	16/5	58	3,998,000		12,200	7.5 s						
Snow	17	Cl	E-NE	24/6	59	4,390,000		17,690	-						
	18	C	W-NW	26/14	58	4,260,000		12,810	7.9 s						
Snow	19	Cl	N-NW	15/-14	58	2,817,000		10,950	4.4 s						
	20	PCl	NE	1/-1	59	3,888,000		10,950	4.8 s						
	21	C	S-SW	37/-10	58	3,259,000		10,980	4.5 s						
	22	PCl	N	21/0	58	3,066,000		16,950	4.5 s						
	23	Cl	N	10/-19	58	3,095,000		17,690	4.7 s						
	24	C	N	2/-25	58	3,108,000		13,420	4.7 s						
	25	C	S	20/-22	57	2,990,000		14,335	121 6/3.7 s						
	26	C	S	38/26	58	3,002,400		10,370	5.3 s						
	27	PCl	N	35/10	61	3,297,800		13,420	5.5 s						
	28	C	NE	31/8	61	3,291,000		12,200	4.1 s						
	29														
	30														
	31														
Ave.						3,353,100		12,265	94 5/84.6 6						
Max.						4,390,000		17,690	6.2 5/41 6						
Min.						2,406,000		9,760	3.2 5/81 6						
		Totals				93,887,000		343,410	133.5 5/246 6						

A

225

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH

ENERAL									DIGESTER NO. 1							DIG				
				B.O.D.																
Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF.		PH Sewage Influent	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Sludge Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced
	15,866	3.2 s						7.7	95	7.0	4.7	9.0	15,860			94	7.1	4.6	1'8	
	12,810	4.3 s						7.7	94	6.95	4.9	8.0	12,810			93	7.1	4.7	1'10	
	17,690	3.7 s						7.5	94	7.0	4.8	8.0	17,690			93	7.1	4.6	3'0	
	11,590	97 6 / 3.7 s						7.6	94	6.95	5.0	5.0	11,590			95	7.05	4.8	1'10	
	11,285	4.3 s						7.4	94	7.0	4.9	5.0	11,285			94	7.05	4.7	2'3	
	12,260	5.6 s						7.4	94	7.0	4.9	6.0	12,200			93	7.0	4.7	2'2	
	12,810	4.1 s						7.4	93	6.9	4.9	7.5	12,810			95	7.0	4.8	1'4	
	9,760	7.4 s						7.4	95	7.0	5.0	5.0	9,760			93	7.0	4.6	2'3	
	10,980	7.5 s						7.4	94	7.0	5.0	6.0	10,980			93	7.0	4.8	1'7	
	13,420	6.2 s						7.4	95	7.0	4.5	6.0	13,420			94	7.0	4.6	3'5	
	9,760	81 0 / 3.5 1						7.4	95	6.9	5.0	7.0	9,760			93	7.0	4.7	2'6	
	10,370	4.0 s						7.5	93	7.0	5.1	7.0	10,370			94	6.9	4.7	1'10	
	11,590	5.1 s						7.5	95	6.85	4.9	7.0	11,590			93	6.9	4.6	3'8	
	10,980	5.3 s						7.3	95	6.8	4.8	8.0	10,980			94	6.85	4.6	2'10	
	10,370	-						7.7	95	6.8	4.8	8.0	10,370			94	6.9	4.6	2'1	
	12,200	7.5 s						7.7	94	6.85	4.9	8.0	12,200			93	6.9	4.7	3'9	
	14,640	-						7.6	94	6.8	4.4	8.0	14,640			94	6.9	4.7	2'11	
	12,810	7.9 s						7.5	95	6.8	4.7	9.0	12,810			94	6.9	4.6	1'11	
	10,950	7.4 s						7.4	94	6.85	4.7	8.0	10,980			93	6.95	4.6	3'1	
	10,950	4.8 s						7.4	95	6.85	4.7	8.0	10,980			94	7.0	4.5	2'4	
	10,980	4.5 s						7.2	94	6.8	4.8	9.0	10,980			94	7.0	4.6	1'7	
	10,950	4.5 s						7.5	95	6.9	4.8	5.0	10,980			93	7.1	4.5	3'8	
	14,640	4.7 s						7.4	94	7.05	4.8	5.0	14,640			92	7.15	4.6	3'0	
	13,420	4.7 s						7.4	93	6.9	5.0	5.0	13,420			94	7.05	4.7	2'0	
	14,335	21 0 / 3.7 s						7.3	93	7.0	5.0	5.0	14,335			94	7.1	4.7	1'4	
	10,370	5.3 s						7.7	93	7.0	5.2	4.5	10,370			95	7.1	4.5	2'0	
	13,420	5.5 s						7.4	93	7.1	4.4	5.0	13,420			93	7.1	4.5	2'6	
	12,200	4.1 s						7.3	93	7.1	4.8	5.0	12,200			94	7.1	4.6	1'7	
	12,265	94 5 / 286 6						7.47	94.1	6.93	4.87	6.7	12,265			93.6	7.01	4.65		
	17,690	6.23 / 41 0						7.7	95	7.1	5.2	9.0	17,690			95	7.15	4.8		
	9,760	3.3 / 41 6						7.2	93	6.8	4.7	4.5	9,760			92	6.85	4.5		
	343,430	133 5 / 296 6											343,430							

B

E TREATMENT PLANT
Y OPERATION REPORT

MONTH Feb. 1960

	DIGESTER NO. 1							DIGESTER NO. 2								
PH Sewage Influent	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Sludge Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge ~~Added~~ Transferred	Gals. Digested Sludge Removed To #3		No. Gallons Sewage Flow G.P.D.
7.7	95	7.0	4.7	9.0	15,860			94	7.1	4.6	1'8		#2 →	18,300		399,600
7.7	94	6.95	4.9	8.0	12,810			93	7.1	4.7	1'10		#2 →	30,500		420,600
7.5	94	7.0	4.5	8.0	17,690			93	7.1	4.6	3'0					425,200
7.6	94	6.95	5.0	5.0	11,590			95	7.05	4.8	1'10		#2	15,460		427,000
7.4	94	7.0	4.9	5.0	11,285			94	7.05	4.7	2'3		#2	9,760		373,600
7.4	94	7.0	4.9	6.0	12,200			93	7.0	4.7	2'2					438,600
7.4	93	6.9	4.9	7.5	12,810			95	7.0	4.8	1'4		#1+2	25,620		404,600
7.4	95	7.0	5.0	5.0	9,760			93	7.0	4.6	2'3					419,500
7.4	94	7.0	5.0	6.0	10,980			93	7.0	4.8	1'7			36,600		430,200
7.4	95	7.0	4.5	6.0	13,420			94	7.0	4.6	3'5					426,800
7.4	95	6.9	5.0	7.0	9,760			93	7.0	4.7	2'6					463,300
7.5	93	7.0	5.1	7.0	10,370			94	6.9	4.7	1'10			36,600		396,000
7.5	95	6.85	4.9	7.0	11,590			93	6.9	4.6	3'8					456,300
7.3	95	6.8	4.8	8.0	10,980			94	6.85	4.6	2'10					481,200
7.7	95	6.8	4.8	8.0	10,370			94	6.9	4.6	2'1			36,600		417,000
7.7	94	6.85	4.9	8.0	12,200			93	6.9	4.7	3'9					424,300
7.6	94	6.8	4.4	8.0	14,640			94	6.9	4.7	2'11					420,200
7.5	95	6.8	4.7	9.0	12,810			94	6.9	4.6	1'11			29,280		435,900
7.4	94	6.85	4.7	8.0	10,980			93	6.95	4.6	3'1					387,100
7.4	95	6.85	4.7	8.0	10,980			94	7.0	4.5	2'4					451,700
7.2	94	6.8	4.8	9.0	10,980			94	7.0	4.6	1'7			36,600		404,000
7.5	95	6.9	4.8	5.0	10,980			93	7.1	4.5	3'8					395,600
7.4	94	7.05	4.8	5.0	14,640			92	7.15	4.6	3'0					421,800
7.4	93	6.9	5.0	5.0	13,420			94	7.05	4.7	2'0					420,400
7.3	93	7.0	5.0	5.0	14,335			94	7.1	4.7	1'4		#1+2	21,460		433,600
7.7	93	7.0	5.2	4.5	10,370			95	7.1	4.5	2'0		#1+2	18,300		386,800
7.4	93	7.1	4.4	5.0	13,420			93	7.1	4.5	2'6					444,500
7.3	93	7.1	4.8	5.0	12,200			94	7.1	4.6	1'7		#1+2	23,180		434,600
7.47	94.1	6.93	4.87	6.7	12,265			93.6	7.01	4.65				26,043		422,910
7.7	95	7.1	5.2	9.0	17,690			95	7.15	4.8						481,200
7.2	93	6.8	4.7	4.5	9,760			92	6.85	4.5						373,600
					343,930									338,560		11,841,600

C

B

	DIGESTER NO. 8									SHIFT OPERATORS Int. for Reg. Time and add overtime if any		
Date	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		RAW SLUDGE AVERAGE PH	Day	Afternoon	Night
1	70	7.05	4.4	2'3					6.2	RAY	ROGER	BOB
2	70	7.0	4.5	2'7					6.1	"	"	"
3	71	7.0	4.4	6"					6.0	HARV.	"	HENRY
4	70	7.0	4.5	2'11					6.0	RAY	"	"
5	72	7.0	4.5	2'11					6.1	"	"	BOB
6	64	6.9	4.5	2'3					6.0	GORDY	"	"
7	64	6.9	4.7	3'11					5.9	"	"	"
8	66	6.9	4.7	2'4					5.8	"	RAY	"
9	66	6.9	4.8	2'8					5.8	"	"	"
10	68	7.0	4.7	1'1					5.9	"	"	"
11	66	7.0	4.8	2'11					5.9	"	"	HENRY
12	68	7.0	4.7	4'0					6.0	"	"	"
13	70	6.95	4.5	1'0					5.8	ROGER	"	BOB
	70	6.9	4.5	1'6					5.9	"	"	"
15	68	6.9	4.6	3'7					5.8	"	GORDON	"
16	70	7.1	4.6	1'3					6.0	"	"	"
17	69	6.95	4.6	1'3					5.8	"	"	"
18	68	6.9	4.5	1'11					5.9	"	"	"
19	70	7.0	4.4	11"					6.0	"	"	HENRY
20	71	7.0	4.4	5"					5.9	HARV	"	"
21	69	7.0	4.4	2'5					5.9	"	"	BOB
22	72	7.0	4.4	1'1					5.9	RAY	ROGER	HENRY
23	70	7.0	4.5	1'1					6.0	"	"	BOB
24	68	6.9	4.7	2'3					5.9	"	"	"
25	-	-	4.7	4'5					6.1	"	"	"
26	70	7.0	4.8	2'11					6.2	"	"	"
27	68	7.0	4.4	1'8					6.3	GORDY		HENRY
28	68	7.1	4.7	3'3					6.2	"	"	"
29												
30												
Ave.	68.7	6.97	4.56						5.97			
Max.	72	7.1	4.8						6.3			
Min.	64	6.9	4.4						5.8			
Totals												

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time – Days
Final Disposal to

Drying Bed No. 2
Drying Time – Days
Final Disposal to

Drying Bed No. 3
Drying Time – Days
Final Disposal to

Drying Bed No. 4
Drying Time – Days
Final Disposal to

Drying Bed No. 5
Drying Time – days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

. P
COMPOSITE S
FLOW M
" DIFFER
INF. SA
EFF. SAM
FLOW = 3,0 9
CLARIFIER TI
B.O.D. = N
SED. SOLIDS =
PH = INF. 7.9

2-14-67	RAW SLUDGE	#1	#2	#3
		BOTTOM		
% TOTAL SOLIDS	4.05	28.24	23.6	8.45
% FIXED	20.65	73.9	68.00	40.62
% VOLATILE	79.35	26.1	31.99	59.38

A

227 228

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

	Afternoon	Night
ay	Roger	Bob
"	"	"
rv.	"	Menzy
ay	"	"
"	"	Bob
rdy	"	"
	"	"
	Ray	"
	"	"
	"	"
	"	Menzy
	"	"
er	"	Bob
	"	"
	Gordon	"
	"	"
	"	"
	"	"
	"	Menzy
rv	"	"
	"	Bob
ay	Roger	Menzy
	"	Bob
	"	"
	"	"
	"	"
rdy	"	Menzy
	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time – Days
Final Disposal to

Drying Bed No. 2
Drying Time – Days
Final Disposal to

Drying Bed No. 3
Drying Time – Days
Final Disposal to

Drying Bed No. 4
Drying Time – Days
Final Disposal to

Drying Bed No. 5
Drying Time – days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

MONTHLY TEST

COMPOSITE SAMPLES
FLOW METER OUT OF ORDER
4 DIPPERS OF SAMPLE PER HOUR
INF. SAMPLES 8 → 11 A.M.
EFF. SAMPLES 11 A.M → 2 P.M
FLOW = 3,025,000 G.P.D.
CLARIFIER TIME = 5 HR. 27 MIN.
B.O.D. = N.G.
SET. SOLIDS = INF. 7.5 ML/L, EFF. 0.01 ML/L, RED. 99+%
PH = INF. 7.2, EFF. 7.25

2-14-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPERNATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	4.05	28.24	23.6	8.45	1.39	29.64	8.45	1.39	1.1	.31	.39
% FIXED	20.65	73.9	68.06	40.02	38.35	58.5	40.02	38.0	40.35	44.02	39.88
% VOLATILE	79.35	26.1	31.94	59.98	61.65	41.5	59.98	62.0	59.65	55.98	60.12

REMARKS

2-2-67 SWITCHED BOILER FROM G
2-2 " " " OI
2-2 → 2-5 BOILER TROUBLE - WATER IN
POINTS ON INSERT
2-7 PEAKE DIST. CO. INSTALLED RELA
CUT DOWN ON POINT BURNING
2-11 SWITCHED BOILER FROM GAS
2-12 " " " OIL
2-15 " " " GAS
2-16 " " " OIL
2-20 " " " GAS
2-21 " " " OIL
2-23 " " " GAS
2-26 " " " OIL

2-15,16, MIXED MENIFEE WORKING
2-26 SHUT OF SIMPLEX — NOT W

2-18 DID NOT CLEAN GRIT CHAMBE
NOT GET #72 — IT WA
2-20 JOHN LULLS INSTALLED NEW
2-22 REC. 5 FULL CHLORINE CYL. FROM
RETURNED 5 EMPTY'S
2-23 REC. 100# H.TH. & 50# PHOS

CHLORINE
2-3-67 REC. 5 FULL LYON'S & RE

NO. MANKATO SEWA
OUR METER = 11,844,600 GAL. THE

CITY GAS METE
232,400 CU. FT. USED IN FEB

Operator in Charge
Ralph R. K

B

ed
d To

. 1
Days
to

. 2
Days
to

. 3
Days
to

. 4
Days
to

. 5
ays
to

Monthly Test
Samples
Meter Out Of Order
eers Of Sample Per Hour
Samples 8 → 11 A.M.
amples 11 A.M. → 2 P.M.
c 95,000 G.P.D.
Time = 5 Hr. 22 Min.
N.G.
: Inf. 7.5 Ml/l, Eff. 0.01 Ml/l, Red. 99+%
7.2, Eff. 7.25

	#1	#2	#3	#1	#2	#3	Super
	5' Off Bottom			10' Off Bottom			Natant
5	1.39	99.64	8.45	1.37	1.1	.31	.39
2	36.38	56.5	46.02	38.0	40.35	44.02	39.8
	61.68	41.5	59.46	62.0	59.65	55.98	60.12

B

REMARKS

2-2-67 Switched Boiler From Gas To Oil
2-2 " " " Oil " Gas
2-2 → 2-5 Boiler Trouble - Water In Fuel Oil + Burnt
Points On Insert
2-7 Peace Dist Co. Installed Relay On Boiler To
Cut Down On Point Burning
2-11 Switched Boiler From Gas To Oil
2-12 " " " Oil " Gas
2-15 " " " Gas " Oil
2-16 " " " Oil " Gas
2-20 " " " Gas " Oil
2-21 " " " Oil " Gas
2-23 " " " Gas " Oil
2-26 " " " Oil " Gas

2-15,16, Mikeo Menifee Working On Simplex
2-26 Shut Of Simplex - Not Working

2-18 Did Not Clean Grit Chambers - Could
Not Get #72 — It Was Out Plowing
2-20 John Wells Installed New Switch On #3 Sludge Pmp
2-22 Rec. 5 Full Chlorine Cyl. From Lyons Chem. Co.
Returned 5 Empty's
2-23 Rec. 100# H.TH. + 50# Phosphate From Shop

Chlorine
2-22-67 Rec. 5 Full Lyon's + Returned 5 Emptys

No. Mankato Sewage Flow
Our Meter = 11,844,600 Gal. Their Meter = 11,553,600 Gal.

City Gas Meter
232,400 Cu. Ft. Used In Feb 67

Operator in Charge
Ralph R. Rader

C

CITY OF MANKATO

SEWAGE T
MONTHLY O

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D.		Ch. Res. EF.		Influent PH
River					Influent F.						Enf.	Ef.			
2.7'	1	CL	S.W	34/21	61°	3,552,600		9,760	5.3 s				.755		7.7
2.7	2	PC	SW	37/21	61	4,044,200		11,640	8.0 s				.51		7.7
2.8	3	PC	NW	29/18	61	3,416,400		13,420	7.5 s				.73		7.8
2.4	4	PC	NW	36/23	61	3,531,000		8,540	92 G/2.2 s				.93		7.7
3.1	5	C	NE	33/14	60	3,052,600		9,150	5.6 s				.95		7.8
3.0	6	C	W-NW	36/-9	59	3,600,000		11,590	4.0 s				.88		7.3
3.8	7	C	N-NW	7/4	58	3,420,000		13,420	5.5 s				.72		7.6
3.1	8	C	S-SW	35/25	59	3,324,000		17,690	4.0 s				.60		7.65
4.3	9	C	SW-W	52/34	57	4,692,000		14,030	5.5 s				.58		7.4
4.1	10	C	E-NE	58/24	59	5,730,600		20,740	5.3 s				.60		7.3
6.1	11	PC	S-SW	34/29	58	3,938,400		19,520	108 G/4.5 s				.67		7.4
7.2	12	CL	N-NE	30/22	58	3,062,200		14,640	4.8 s				.88		7.2
8.13	13	CL	NW	28/16	59	3,756,000		9,760	4.0 s				.68		7.7
8.3	14	C	N	28/14	58	3,609,600		6,100	4.0 s				.66		7.3
8.2	15	C	N	28/15	58	3,624,000		8,540	4.3 s				.83		7.1
7.1	16	PCL	N	28/-2	59	3,447,000		10,980	4.5 s				.76		7.3
7.6	17	C	NW	24/-1	57	3,399,200		9,760	4.7 s				.46		7.4
7.0	18	CL	SE	30/8	58	3,183,600		10,980	95 G/3.2 s				.46		7.4
6.64	19	CL	S	37/29	58	2,886,600		8,540	5.6 s				.71		7.5
6.3	20	CL	W-NW	35/31	60	3,379,200		12,200	4.5 s				.40		7.3
6.0	21	PCL	N-NE	33/26	61	3,120,600		12,810	4.0 s				.45		7.4
5.2	22	PCL	S	56/26	58	4,386,000		9,760	4.7 s				.45		7.4
7.7	23	PCL	N	50/38	58	4,096,200		12,200	6.4 s				.73		7.3
7.7	24	PCL	SW	62/35	61	4,348,400		21,960	4.3 s				.55		7.3
8.8	25	PCL	S	56/33	60	4,145,400		17,640	92 G/4.0 s				.71		7.4
9.85	26	CL	N	42/31	55	3,826,800		12,200	4.8 s				.80		7.1
11.27	27	CL	CALM	47/30	55	4,041,600		9,150	4.7 s				.40		7.1
10.58	28	CL	E-NE	57/40	58	4,010,400		2,930	4.6 s				.64		7.4
10.35	29	CL	S-SE	66/59	57	4,109,600		12,200	4.3 s				.66		7.4
10.27	30	CL	E-SE	70/45	58	3,733,600		25,620	4.4 s				.77		7.7
10.32	31	C	W-SW	58/26	—	5,340,000		17,080	—				.58		—
Ave.				40/23.4		3,800,000		12,899	97 G/4.79 s				.65		7.45
Max.				76/59		5,730,600		25,620	108 G/8.0 s				.95		7.8
Min.				7/-9		2,886,600		6,100	92 G/2.2 s				.40		7.1
A		Totals				117,901,600		399,556	389 G/143.83						

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH

AL				B.O.D.					DIGESTER NO. 1							DIGEST					
Ch. sed	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF.		Influent PH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added
	9,760	5.3 s				.255		7.7	93	7.0	4.8	5.0	9,760			95	7.1	4.8	2'6		
	14,640	8.0 s				.51		7.7	94	7.1	4.8	5.0	14,640			93	7.1	4.7	2'3		
	13,420	7.5 s				.73		7.8	93	7.0	5.0	4.0	13,420			95	7.1	4.8	1'8		
	8,540	92 6 / 3.3 s				.93		7.7	95	7.1	4.8	5.0	8,540			94	7.1	4.9	2'3		
	9,150	5.6 s				.95		7.8	94	7.0	4.9	5.0	9,150			95	7.1	4.8	1'8		
	11,590	4.0 s				.88		7.3	95	6.9	4.7	5.0	11,590			94	7.0	4.65	2'3		
	13,420	5.5 s				.72		7.6	95	6.95	4.15	6.0	13,420			94	7.0	4.05	1'6		
	17,690	4.0 s				.60		7.65	95	6.9	4.9	6.0	17,690			94	6.95	4.8	2'7		
	14,030	5.5 s				.58		7.4	95	6.9	4.8	9.0	14,030			94	6.95	4.7	1'4		
	20,740	5.3 s				.60		7.3	95	6.8	5.0	9.0	20,740			94	6.9	4.8	3'7		
	19,520	108 6 / 4.5 s				.67		7.4	93	6.8	4.5	9.0	19,520			94	6.9	4.3	2'2		
	14,640	4.8 s				.88		7.2	94	6.8	5.0	5.0	14,640			93	6.9	4.8	3'4		
	9,760	4.0 s				.68		7.7	94	7.0	5.0	5.0	9,760			95	7.05	4.8	2'4		
	6,100	4.0 s				.66		7.3	94	6.9	4.3	5.0	6,100			95	7.05	4.3	1'8		
	8,540	4.3 s				.43		7.1	94	6.95	4.8	3.0	8,540			95	7.05	4.7	3'9		
	10,980	4.5 s				.76		7.3	94	6.9	4.7	2.5	10,950			95	7.0	4.7	3'2		
	9,760	4.7 s				.46		7.4	94	6.9	4.6	4.0	9,760			94	7.1	4.5	2'5		
	10,980	95 6 / 3.2 s				.46		7.4	95	6.9	4.7	4.0	10,980			94	7.1	4.5	3'3		
	8,540	5.6 s				.71		7.5	94	6.9	4.7	6.0	8,540			95	7.05	4.6	2'6		
	12,200	4.5 s				.40		7.3	95	7.0	4.6	7.0	12,200			93	7.0	4.5	3'2		
	12,810	4.0 s				.45		7.4	95	6.9	4.6	7.0	12,810			94	7.0	4.5	2'4		
	9,760	4.7 s				.45		7.4	95	6.9	4.6	7.0	9,760			94	6.9	4.5	4'2		
	12,200	6.4 s				.73		7.3	94	6.8	4.7	7.0	12,200			95	6.9	4.7	3'6		
	21,960	4.3 s				.55		7.3	94	6.8	4.7	6.0	21,960			93	6.9	4.6	2'8		
	14,640	92 6 / 4.6 s				.71		7.4	95	6.9	4.9	4.5	14,640			93	7.0	4.8	2'8		
	12,200	4.8 s				.80		7.1	95	6.9	4.4	4.5	12,200			93	7.0	4.8	2'8		
	9,150	4.7 s				.40		7.1	95	6.8	4.5	5.0	9,150			92	6.85	4.5	1'6		
	7,930	4.6 s				.64		7.4	95	6.8	4.7	5.0	7,930			93	6.8	4.6	2'5		
	12,200	4.3 s				.66		7.4	94	6.8	4.6	7.0	12,200			95	6.8	4.5	1'11		
	25,620	4.4 s				.77		7.7	95	6.8	3.8	6.0	25,620			94	6.9	3.8	3'4		
	17,080	—				.58		—	94	6.8	4.7	7.0	17,080			94	6.9	4.7	1'7		
	12,889	97 6 / 4.79 s				.65		7.45	94.4	6.9	4.69	5.7	12,889			94	6.98	4.6			
	25,620	108 6 / 8.0 s				.95		7.8	95	7.1	5.0	9.0	25,620			95	7.1	4.9			
	6,100	92 6 / 3.3 s				.40		7.1	93	6.8	3.8	2.5	6,100			92	6.8	3.8			
	399,550	389 6 / 143.65											399,550								

TREATMENT PLANT
OPERATION REPORT

MONTH March 1967

	DIGESTER NO. 1							DIGESTER NO. 2								
Effluent Ph	Temp.	P.h.	Pressure	~~Cu. ft. Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3 1+2 → 3		No. Mankato Sewage Flow G.P.D.
.7	93	7.0	4.8	5.0	9,760			95	7.1	4.8	2'6			8,540		519,400
.7	94	7.1	4.8	5.0	14,640			93	7.1	4.7	2'3			6,100		648,000
.8	93	7.0	5.0	4.0	13,420			95	7.1	4.8	1'8			21,960		560,700
.7	95	7.1	4.8	5.0	8,540			94	7.1	4.9	2'3					565,000
.8	94	7.0	4.9	5.0	9,150			95	7.1	4.8	1'8			18,300		477,460
3	95	6.9	4.7	5.0	11,590			94	7.0	4.65	2'3					564,600
6	95	6.95	4.15	6.0	13,420			94	7.0	4.05	1'6			29,280		440,000
45	95	6.9	4.9	6.0	17,690			94	6.95	4.8	2'7					438,400
4	95	6.9	4.8	9.0	14,030			94	6.95	4.7	1'4			46,360		716,900
3	95	6.8	5.0	9.0	20,740			94	6.9	4.8	3'7					810,700
4	93	6.8	4.5	9.0	19,520			94	6.9	4.3	2'2			36,660		577,300
2	94	6.8	5.0	5.0	14,640			93	6.9	4.8	3'4					456,460
7	94	7.0	5.0	5.0	9,760			95	7.05	4.8	2'4					513,200
3	94	6.9	4.3	5.0	6,100			95	7.05	4.3	1'8			36,600		488,400
1	94	6.95	4.8	3.0	8,540			95	7.05	4.7	3'9					491,600
3	94	6.9	4.7	2.5	10,980			95	7.0	4.7	3'2					477,200
4	94	6.9	4.6	4.0	9,760			94	7.1	4.5	2'5			21,960		474,800
4	95	6.9	4.7	4.0	10,980			94	7.1	4.5	3'3					467,400
5	94	6.9	4.7	6.0	8,540			95	7.05	4.6	2'6			18,300		404,000
3	95	7.0	4.6	7.0	12,200			93	7.0	4.5	3'2					495,460
4	95	6.9	4.6	7.0	12,810			94	7.0	4.5	2'4			39,650		466,200
4	95	6.9	4.6	7.0	9,760			94	6.9	4.5	4'2					563,100
3	94	6.8	4.7	7.0	12,200			95	6.9	4.7	3'6					527,300
3	94	6.8	4.7	6.0	21,960			93	6.9	4.6	2'8			18,300		553,200
4	95	6.9	4.9	4.5	14,640			93	7.0	4.8	2'8			15,300		545,900
1	95	6.9	4.4	4.5	12,200			93	7.0	4.8	2'8					487,200
1	95	6.8	4.5	5.0	9,150			92	6.85	4.5	1'6			18,300		567,700
4	95	6.8	4.7	5.0	7,930			93	6.8	4.6	2'5					527,300
4	94	6.8	4.6	7.0	12,200			95	6.8	4.5	1'11			31,720		519,200
7	95	6.8	3.8	6.0	25,620			94	6.9	3.8	3'4					539,800
	94	6.8	4.7	7.0	17,080			94	6.9	4.7	1'7			34,160		520,200
5	94.4	6.9	4.69	5.7	12,889			94	6.98	4.6				25,277		530,090
8	95	7.1	5.0	9.0	25,620			95	7.1	4.9				46,360		810,700
1	93	6.8	3.8	2.5	6,100			92	6.8	3.8				6,100		438,400
					399,550									404,430		16,432,900

C

Date	DIGESTER NO. 3 Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge ~~Added~~ HAULED	~~Gals. Digested~~ Sludge ~~Removed~~ To	DRIVER	RAW SLUDGE AVERAGE PH	SHIFT OPERATORS Int. for Reg. Time and add overtime if any Day	Afternoon	Night
1	66	7.1	4.7	2'8		2745	DON FELEY	HH	6.1	GORDY	RAY	BOB
2	70	7.1	4.7	3'7					6.0	"	"	"
3	66	7.1	4.7	4'0					6.0	"	"	"
4	68	7.0	4.7	2'6					6.1	"	"	"
5	66	7.0	4.6	2'6					6.1	"	"	"
6	70	7.0	4.6	1'3					5.9	ROGER	HARV.	"
7	67	6.9	4.7	3'1					5.9	"	RAY	MONTY
8	69	6.95	4.6	1'11					6.0	"	GORDY	"
9	69	6.95	4.6	3'7					5.9	"	"	BOB
10	74	6.8	4.6	1'0					5.8	"	"	"
11	72	6.9	4.1	2'6					6.0	HARV	"	"
12	73	6.9	4.6	1'0					5.8	"	"	"
	73	7.0	4.6	1'0					5.9	RAY	"	"
14	73	6.9	4.2	2'5		1560	" "	RR	6.1	"	"	"
15	72	7.0	4.6	1'1		3660	" "	RR	6.0	"	ROGER	MONTY
16	73	6.9	4.6	2'6		3660	" "	RR	6.0	"	"	"
17	–	–	4.6	4'5		5490	" "	HH	6.0	"	"	BOB
18	70	7.0	4.6	3'0		5795	H. BROOKS	RR	6.0	"	"	"
19	–	–	4.5	3'8		19,520	" "	HH	6.0	"	"	"
20	71	7.0	4.4	3'3					6.0	GORDY	"	"
21	72	6.9	4.4	4'3					5.9	"	"	"
22	70	7.0	4.4	1'7					5.9	"	RAY	"
23	–	–	4.6	3'4		4540	" "	HH	5.9	"	"	MONTY
24	71	6.9	4.5	4'0					5.7	"	"	"
25	72	6.9	4.7	1'6					5.8	"	"	BOB
26	73	6.85	4.4	3'4					6.1	"	"	"
27	72	6.9	4.7	1'6					5.7	ROGER	"	"
28	74	6.8	4.4	3'0					5.9	"	"	"
29	74	6.8	4.4	3'2					5.9	"	GORDY	GEO.
30	76	6.9	3.65	1'0					5.8	"	"	BOB
31	75	6.9	4.4	2'9					6.0	"	"	MONTY
Ave.	71.1	6.94	4.5						5.94			
Max.	76	7.1	4.7						6.1			
Min.	66	6.8	3.65						5.7			
Totals .												

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

3-28-67	RAW SLUDGE	#1	#2	#3	#1
		BOTTOM			5'
% TOTAL SOLIDS	4.27	35.45	21.5	9.62	8.4
% FIXED	25.78	79.9	67.5	40.84	41.5
% VOLATILE	74.22	20.1	32.5	59.16	58.

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

AVERAGE PH	Day	Afternoon	Night
.1	GORDY	RAY	BOB
0	"	"	"
.0	"	"	"
1	"	"	"
1	"	"	"
9	ROGER	HARV.	"
9	"	RAY	MONTY
0	"	GORDY	"
9	"	"	BOB
8	"	"	"
0	HARV	"	"
8	"	"	"
9	RAY	"	"
1	"	"	"
0	"	ROGER	MONTY
0	"	"	"
0	"	"	BOB
0	"	"	"
0	"	"	"
0	GORDY	"	"
9	"	"	"
9	"	RAY	"
9	"	"	MONTY
7	"	"	"
8	"	"	BOB
1	"	"	"
7	ROGER	"	"
9	"	"	"
9	"	GORDY	GEO.
8	"	"	BOB
0	"	"	MONTY
4			
1			
7			

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

REMA

3-1-67 KOST PULLED IN #
SIMPLEX IS STILL
3-3- PACKED #3 MAIN PU
3-9 INSTALLED PRESSURE R
3-14 " SOLINOIDS
3-22 J. LARSEN RUN CONDUIT &
8:00-12:00 & 12:00
3-23 PACKED RECIR. PUMP
3-24 SOMEBODY PUMP SKIM
3-31 MANKATO ELEC. WORK
3-31 SIMPLEX BACK INT
MIKE WORKED 29 TH

CHLORIN
3-1-67 10 CYL ON HAND }
4-1-67 10 " " " }

NO MANKATO
OUR METER 16,432,900 GAL, T

CITY GAS METER
294,100 CU. FT. USED.

MONTHLY TEST
COMPOSITE SAMPLES - HOU
200 ML/25,000 GAL.
INF. SAMPLES 8:00 A.M. -
EFF. " 11:00AM -
FLOW = 5,340,000 G.P.D.
CLARIFIER TIME = 3 HOUR
B.O.D. = INF. 195 ppm, EFF. 9
SED SOLIDS INF. 5 ML/L, EFF.
PH INF. 8.3, EFF.

3-28-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPER NATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	4.27	35.45	21.5	7.62	1.41	1.07	3.06	1.40	1.09	3.07	.3
% FIXED	25.78	79.9	67.5	40.84	41.73	39.56	41.43	40.66	41.39	39.45	40.56
% VOLATILE	74.22	20.1	32.5	59.16	58.27	60.44	58.57	59.34	58.61	60.55	59.44

Operator in Charge

Ralph

To

1
ays
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2
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5
ays
o

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REMARKS

3-1-67 KOST PULLED IN #99 FROM EAGLE LAKE
SIMPLEX IS STILL BROKE
3-3- PACKED #3 MAIN PUMP WITH TEFLON
3-9 INSTALLED PRESSURE REDUCING VALVE ON MAIN PUMPS
3-14 " SOLINOIDS VALVES ON MAIN PUMPS
3-22 J. LARSEN RUN CONDUIT + WIRING FOR SOLINOIDS
8:00-12:00 + 12:00-4:00
3-23 PACKED RECIR. PUMP WITH TEFLON
3-24 SOMEBODY PUMP SKIM LAGOON INTO DIGESTER??
3-31 MANKATO ELEC. WORKED ON COMP. RETURN PUMP
3-31 SIMPLEX BACK INTO OPERATION
MIKE WORKED 29TH + 30TH — NO CHARGE

CHLORINE
3-1-67 10 CYL ON HAND } NONE RECEIVED
4-1-67 10 " " " } NONE RETURNED

NO MANKATO SEWAGE FLOW
OUR METER 16,432,900 GAL, THEIR METER 15,837,300 GAL

CITY GAS METER READING
294,100 CU. FT. USED IN MARCH

MONTHLY TEST (3-31-67)
COMPOSITE SAMPLES - HOURLY
200 ML/25,000 GAL.
INF. SAMPLES 8:00 A.M. - 11:00 A.M.
EFF. " 11:00 AM - 2:00 P.M.
FLOW = 5,340,000 G.P.D.
CLARIFIER TIME = 3 HOUR 8 MIN
B.O.D. = INF. 195 ppm, EFF. 78.7 ppm, RED. 59.64 %
SED SOLIDS INF. 5 ML/L, EFF. TRACE
PH INF. 8.3, EFF. 8.2.

	#1	#2	#3	#1	#2	#3	SUPER
	5' OFF BOTTOM			10' OFF BOTTOM			NATANT
2	1.41	1.07	3.06	1.40	1.69	3.09	.3
4	41.73	39.56	41.43	40.66	41.39	39.45	40.56
%	58.27	60.41	58.57	59.34	58.61	60.55	59.44

Operator in Charge
Ralph R. Rader

CITY OF MANKATO

SEWAGE TREATMEN
MONTHLY OPERATIO

GENERAL

Day of Week River	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage Influent	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. EF. Aver.		P.H. Influent	Temp.	P.h.
EAVY RAIN 2.5"	1	P.CL	N-NE	40/24	57	10,063,800		12,690	82 G/3.9 S				.74		7.8	94	6.9
11.79	2	CL	W-NW	45/24	53	10,784,200		10,980	8.7 S				OFF		7.4	94	6.8
14.1	3	C	N	52/28	55	6,792,000		2,440	3.3 S				OFF		7.8	94	6.9
14.82	4	P-CL	S	61/34	56	6,600,100		8,540	3.5 S				.65		8.1	94	6.8
15.17	5	P-CL	SE	58/37	57	7,568,000		9,760	3.5 S				.44		7.3	95	6.9
14.84	6	CL	SE	38/25	56	6,908,000		7,320	4.5 S				.78		8.0	95	6.9
14.08	7	C	SE	48/29	57	6,554,000		12,200	3.9 S				.81		7.4	95	6.9
13.16	8	CL	SE	54/40	57	6,504,000		9,760	4.0 S				.63		7.7	95	6.9
12.51	9	CL	N	52/25	57	5,893,000		7,320	3.3 S				.76		7.6	95	6.9
12.04	10	CL	NE	45/30	56	6,249,000		12,810	189 G/2.5 S				.98		7.4	95	6.9
11.45	11	C	NE	48/41	57	6,226,000		9,760	7.9 S				1.02		7.5	95	6.8
10.91	12	P.CL	NE	49/41	57	5,497,000		9,760	4.7 S				1.14		7.5	95	6.8
10.41	13	C	NE	59/41	57	6,016,000		9,760	4.6 S				.81		7.5	95	6.8
10.04	14	C	SW	60/43	58	6,098,000		12,200	5.1 S				1.23		7.4	95	6.8
9.77	15	C	S	67/44	58	5,783,000		8,540	81 G/4.5 S				1.08		7.5	95	6.9
9.46	16	P.CL	S	82/40	58	5,429,000		7,320	4.5 S				1.36		7.4	95	6.8
9.16	17	CL	W-NW	35/31	59	5,900,000		9,760	5.3 S				.61		7.6	95	6.8
8.81	18	CL	N-NW	35/31	56	5,666,000		9,760	4.1 S				.48		7.7	95	6.8
	19	CL	NE	62/47	55	5,664,000		14,640	4.0 S				.65		7.7	95	6.8
	20	CL	S-SE	56/37	58	5,650,000		10,980	4.3 S				.98		7.2	95	6.8
	21	C	CALM	44/29	55	5,570,000		15,860	4.0 S				.88		7.5	95	6.75
	22	P.CL	N-NW	34/26	56	5,250,000		14,640	87 G/3.5 S				.95		7.5	95	6.9
	23	CL	W-NW	35/32	57	4,888,000		24,400	4.0 S				1.00		7.4	94	6.8
6.98	24	C	S-W	48/32	60	5,380,000		18,300	6.7 S				.99		7.2	93	6.8
6.70	25	P-CL	S-SE	56/36	59	5,230,000		17,690	4.0 S				1.01		7.3	93	6.75
	26	P-CL	S-W	58/32	58	5,218,000		11,590	4.8 S				.76		7.4	94	6.8
6.3	27	P-CL	NE	62/40	56	5,266,000		13,420	5.5 S				.85		6.8	95	6.6
6.17	28	P-CL	SE	69/50	56	5,074,000		12,200	4.6 S				.66		7.0	95	6.6
6.0	29	CL	SE	62/53	57	5,154,000		19,520	81 G/5.1 S				.79		7.1	95	6.7
8.34	30	CL	SE	68/35	56	5,773,000		18,300	8.0 S				—		7.4	95	6.7
	31																
Ave.				52.7/35.1	56.8	6,171,800		12,241	104 G/4.61 S				.87		7.47	94.7	6.81
Max.				82/53	60.0	10,784,200		24,400	189 G/8.7 S				1.36		8.1	95	6.9
Min.				34/22	53.0	4,888,000		2,440	81 G/3.1 S				0.0		6.8	93	6.7
		Totals				185,154,600			530 G/138.3 S								

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH April

		B.O.D.					DIGESTER NO. 1								DIGESTER NO. 2					
Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF. Aver.		P.H. Influent	Temp.	P.h.	Pressure	~~Cu-ft-Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3
G / 3.9 s				.74		7.8	94	6.9	4.7	5.0	17,690			94	6.95	4.5	2'9			
8.7 s				OFF		7.4	94	6.8	5.0	6.0	10,980			93	6.9	4.6	1'6			31,720
3.3 s				OFF		7.8	94	6.9	4.8	5.0	2,440			93	7.0	4.6	2'6			
3.5 s				.65		8.1	94	6.8	4.5	4.5	8,540			95	6.9	4.3	2'4			
3.5 s				.49		7.3	95	6.9	4.4	5.0	9,760			94	7.0	4.3	1'4			14,640
4.5 s				.78		8.0	95	6.9	4.8	5.5	7,320			94	7.0	4.6	2'1			
3.9 s				.81		7.4	95	6.9	3.1	5.0	12,200			94	7.0	3.0	1'7			15,860
4.0 s				.63		7.7	95	6.9	4.7	5.0	9,760			94	7.0	4.6	1'10			
3.3 s				.76		7.6	95	6.9	4.6	5.0	7,320			94	7.05	4.5	1'2			15,860
19 G / 2.5 s				.98		7.4	95	6.9	4.1	5.0	12,810			94	6.9	4.0	1'9			10,980
7.9 s				1.02		7.5	95	6.8	4.6	5.5	9,760			94	6.9	4.5	1'8			24,400
4.7 s				1.14		7.5	95	6.8	4.5	6.0	9,760			94	6.9	4.5	2'8			
4.6 s				.81		7.5	95	6.8	4.3	5.5	9,760			94	7.0	4.2	2'0			30,500
5.1 s				1.23		7.4	95	6.8	4.6	5.0	12,200			94	6.8	4.4	3'5			
21 G / 4.5 s				1.08		7.5	95	6.9	4.5	5.0	8,540			94	6.9	4.4	2'7			
4.5 s				1.36		7.4	95	6.8	4.6	5.0	7,320			94	7.0	4.5	2'0			24,460
5.3 s				.64		7.6	95	6.8	3.4	4.5	9,760			94	6.9	3.3	3'2			
4.1 s				.48		7.7	95	6.8	4.6	5.0	9,760			94	6.9	4.5	3'6			
4.0 s				.65		7.7	95	6.8	4.3	5.0	14,640			94	6.9	4.2	1'10			
4.3 s				.98		7.2	95	6.8	4.4	6.0	10,980			94	6.9	4.3	10"			59,780
4.0 s				.88		7.5	95	6.75	4.3	5.0	15,860			94	6.8	4.2	4'2			
27 G / 3.5 s				.95		7.5	95	6.9	4.6	5.0	14,640			94	6.9	4.4	3'1			
4.0 s				1.00		7.4	94	6.8	4.5	7.0	24,400			94	7.0	4.4	2'1			17,080
.7 s				.99		7.2	93	6.8	4.8	5.0	18,300			94	6.9	4.6	1'7			
4.0 s				1.01		7.3	93	6.75	4.9	4.0	17,690			93	6.9	4.7	4"			26,840
4.8 s				.76		7.4	94	6.8	4.8	5.0	11,590			93	6.9	4.7	11.5"			34,160
.5 s				.85		6.8	95	6.6	4.8	5.0	13,420			94	6.7	4.7	2'6			
.8 s				.66		7.0	95	6.6	5.2	5.0	12,200			94	6.8	4.9	1'7			48,800
21 G / 3.1 s				.79		7.1	95	6.7	5.1	5.0	19,520			94	6.75	4.9	4'1			
3.0 s				—		7.4	95	6.7	5.4	5.0	18,300			94	6.8	5.2	2'9			14,140
24 G / 4.61 s				.87		7.47	94.7	6.81	4.56	5.15	12,241			93.9	6.91	4.42				26,404
37 G / 8.7 s				1.36		8.1	95	6.9	5.4	7.0	24,400			95	7.05	5.2				59,780
16 G / 3.1 s				0.0		6.8	93	6.7	3.1	4.0	2,440			93	6.7	3.0				10,980
20 G / 138.3 s											367,220									369,660

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TMENT PLANT
ATION REPORT

MONTH April 1967

DIGESTER NO. 1						DIGESTER NO. 2								
P.h.	Pressure	~~Cu-ft Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		No Mankato Sewage Flow G.P.D.
.9	4.7	5.0	17,690			94	6.95	4.5	2'9					902,
.8	5.0	6.0	10,980			93	6.9	4.6	1'6			31,720		858,
.9	4.8	5.0	2,440			93	7.0	4.6	2'6					754,000
.8	4.5	4.5	8,540			95	6.9	4.3	2'4					661,400
.9	4.4	5.0	9,760			94	7.0	4.3	1'4			14,640		639,000
.9	4.8	5.5	7,320			94	7.0	4.6	2'1					601,400
.9	3.1	5.0	12,200			94	7.0	3.0	1'7			15,860		628,400
.9	4.7	5.0	9,760			94	7.0	4.6	1'10					671,000
.9	4.6	5.0	7,320			94	7.05	4.5	1'2			15,860		564,400
.9	4.1	5.0	12,810			94	6.9	4.0	1'9			10,980		628,500
.8	4.6	5.5	9,760			94	6.9	4.5	1'8			24,400		571,700
.8	4.5	6.0	9,760			94	6.9	4.5	2'8					566,500
.8	4.3	5.5	9,760			94	7.0	4.2	2'0			30,500		585,900
.8	4.6	5.0	12,200			94	6.8	4.4	3'5					609,300
.9	4.5	5.0	8,540			94	6.9	4.4	2'7					597,300
.8	4.6	5.0	7,320			94	7.0	4.5	2'0			24,460		535,700
.8	3.4	4.5	9,760			94	6.9	3.3	3'2					591,300
.8	4.6	5.0	9,760			94	6.9	4.5	3'6					574,700
.8	4.3	5.0	14,640			94	6.9	4.2	1'10					576,200
.8	4.4	6.0	10,980			94	6.9	4.3	10"			59,780		569,500
.75	4.3	5.0	15,860			94	6.5	4.2	4'2					601,400
.9	4.6	5.0	14,640			94	6.9	4.4	3'1					548,700
.8	4.5	7.0	24,400			94	7.0	4.4	2'1			17,080		488,200
.8	4.8	5.0	18,300			94	6.9	4.6	1'7					573,800
.95	4.9	4.0	17,690			93	6.9	4.7	4"			26,840		562,200
.8	4.8	5.0	11,590			93	6.9	4.7	11.5"			34,160		561,200
.6	4.8	5.0	13,420			94	6.7	4.7	2'6					582,800
.6	5.2	5.0	12,200			94	6.8	4.9	1'7			48,800		588,800
.7	5.1	5.0	19,520			94	6.75	4.9	4'1					565,400
.7	5.4	5.0	18,300			94	6.8	5.2	2'9			14,640		881,700
.81	4.56	5.15	12,241			93.9	6.91	4.42				26,404		620,370
.9	5.4	7.0	24,400			95	7.05	5.2				59,780		962,100
.7	3.1	4.0	2,440			93	6.7	3.0				10,980		488,200
			367,220									369,660		18,611,200

B

C

Date	DIGESTER NO. 3 Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. ~~Raw~~ Sludge ~~Added~~ REMOVED	Gals. Digested Sludge Removed To	DRIVER	RAW SLUDGE AVERAGE PH	SHIFT OPERATORS Int. for Reg. Time and add overtime if any Day	Afternoon	Night
1	76	6.95	4.4	1'6					5.9	ROGER	GORDY	MONTY
2	78	6.8	4.4	3'2					5.9	"	"	BOB
3	73	6.85	4.5	1'0					5.8	RAY	"	"
4	74	6.9	4.2	1'0					6.2	"	"	"
5	75	6.9	4.2	5'6					6.0	"	ROGER	"
6	75	7.0	4.4	2'10					6.2	"	"	"
7	74	7.0	2.9	2'11					6.1	"	"	"
8	73	6.95	4.4	1'10					6.0	"	"	MONTY
9	73	6.95	4.3	1'10					6.2	"	"	"
10	72	6.9	3.4	9"					6.1	GORDY	"	BOB
11	73	6.9	4.2	6"					6.0	"	"	"
12	72	6.9	4.2	4"					5.9	"	RAY	"
13	74	7.0	4.1	2'11					5.9	"	"	"
14	74	6.9	4.4	1'9					6.0	"	"	"
15	75	7.0	4.2	1'9					6.0	"	"	"
16	74	7.0	4.5	1'9					5.9	"	"	MONTY
17	76	6.9	3.2	1'3.5					5.9	ROGER	"	"
18	73	6.95	4.3	1'3.5					6.1	"	"	BOB
19	73	6.9	4.0	4'0					5.9	HARV	GORDY	"
20	-	-	4.2	4'4					5.8	ROGER	"	"
21	76	6.85	4.2	3"					5.9	"	"	"
22	75	7.0	4.35	3"		18,300	H. BROOKS	HH	6.0	"	"	"
23	74	7.0	4.35	1'6					6.1	"	"	"
24	74	6.9	4.5	4"					5.8	RAY	"	MONTY
25	76	6.9	46	2'2					5.7	"	"	"
26	76	7.0	4.6	2'6		2,440	" "	HH	6.1	"	ROGER	BOB
27	76	6.8	4.5	6"					5.9	"	"	"
28	76	6.8	4.7	3'6		23,790	" "	HH	6.1	"	"	"
29	78	6.8	4.7	1'4		21,960	" "	HH	5.7	"	"	"
30	78	6.7	4.9	2'5					5.8	"	"	"
31												
Ave.	74.7	6.91	4.26						5.96			
Max.	78	7.0	4.9				23,790		6.2			
Min.	72	6.7	2.9						5.7			
Totals							66,490					

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out Mo
To SELECTER –
HAULING –
SAMPLES = INFLUE
= EFFLUE
FLOW = 5.26
CLARIFIER TIME =
B.O.D. = INF. 137
SEP. S. = INF. 20
SUSP. S. = INF 42
P.H. = INF. 7.

4-26-67	RAW SLUDGE	#1	#2	#3
		BOTTOM		
% TOTAL SOLIDS	6.7	12.72	23.13	6.7
% FIXED	70.05	64.55	60.89	72.4
% VOLATILE	39.95	35.45	39.11	57.6

IFT OPERATORS

t. for Reg. Time and
dd overtime if any

	Afternoon	Night
ER	GORDY	MONTY
	"	BOB
	"	"
	"	"
	ROGER	"
	"	"
	"	"
	"	MONTY
	"	"
Y	"	BOB
	"	"
	RAY	"
	"	"
	"	"
	"	"
	"	MONTY
ER	"	"
	"	BOB
V	GORDY	"
ER	"	"
	"	"
	"	"
	"	"
	"	MONTY
	"	"
	ROGER	BOB
	"	"
	"	"
	"	"
	"	"

Cu. Ft. Digested
Sludge Pumped To
This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out MONTHLY TEST (4-27-67)
To SELECTOR - OFF
HAULING - NO
SAMPLES = INFLUENT = GRAB = 8, 9, + 10 A.M.
= EFFLUENT = COMPOSITE = 24 HOURLY
FLOW = 5,266,000 G.P.D.
CLARIFIER TIME = 3 HOUR 11 MINUTES
B.O.D. = INF. 137.5 ppm, EFF. = 75.0 ppm, RED. 45.45 %
SET. S. : INF. 7.0 ML/L, EFF. 0.02 ML/L, RED. 99.71 %
SUSP. S. = INF 42 ppm, EFF. 23.7 ppm, RED. 43.6 %
P.H. : INF. 7.7, EFF : 7.5 ppm

4-26-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPER NATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	6.7	12.72	23.13	6.7	1.29	NG	NG	1.31	.89	.26	.24
% FIXED	20.05	64.55	60.89	72.4	41.94	NG	NG	39.32	41.24	49.63	37.82
% VOLATILE	79.95	35.45	39.11	27.6	58.06	NG	NG	60.68	58.76	50.37	62.18

RB

REMARKS

4-1-67, 10:30 P.M. - PUMPED THRU BY-
4-2 3:10 P.M. - STARTED FLOW
4-2 10:00 P.M. - FULL LOAD TO PL
BY-PASS TIME = 23.5 H
4-3 MANKATO ELEC. WORKED ON
4-3 11:20 A.M. - PUMPED THRU BY-P
4-4 12:00 NOON - STARTED FLOW TO
BY-PASS TIME = 23.5 HOURS
4-6 RECEIVED 5 LYON'S CYL., RETURN
4-11 BY-PASSED 20 MIN., POWER OFF,
4-21 NALCO CHEM CO. RUNNING TE
4-30 11:15 A.M., BY-PASSED
4-30 2:30 P.M., INTO PLANT
BY-PASS TIME = 3¼ HR.

TOTAL TIME BY-PASSED THIS M

CITY GAS METER
USED IN APRIL = 154,200 CU.

NO. MANKATO SEWAGE
OUR'S = 18,611,200 GAL., THEIR'S = 18,2

CHLORINE
4-6-67 RECEIVED 5 LYON'S CYL., RETUR

Operator in Charge

Ralph R. Ra

REMARKS

4-1-67, 10:30 P.M. - PUMPED THRU BY-PASS
4-2 3:10 P.M - STARTED FLOW TO PLANT
4-2 10:00 P.M - FULL LOAD TO PLANT
BY-PASS TIME = 23.5 HRS.
4-3 MANKATO ELEC. WORKED ON COMP. PUMP
4-3 11:20 A.M - PUMPED THRU BY-PASS
4-4 12:00 NOON - STARTED FLOW TO PLANT
BY-PASS TIME = 23.5 HOURS
4-6 RECEIVED 5 LYON'S CYL., RETURNED 4 EMPTY'S
4-11 BY-PASSED 20 MIN., POWER OFF, N.S.P. CHECKING SERVICE
4-21 NALCO CHEM CO. RUNNING TEST ON PLANT
4-30 11:15 A.M., BY-PASSED
4-30 2:30 P.M., INTO PLANT
BY-PASS TIME = 3 1/4 HR.

TOTAL TIME BY-PASSED THIS MONTH 50 3/4 HOURS

CITY GAS METER
USED IN APRIL = 154,200 CU. FT.

NO. MANKATO SEWAGE FLOW
OUR'S = 18,611,200 GAL., THEIR'S = 18,240,200 GAL.

CHLORINE
4-6-67 RECEIVED 5 LYON'S CYL., RETURNED 4 LYON'S EMPTY'S

LY TEST (4-27-67)
EFF
10
= GRAB = 8, 9, + 10 A.M.
-COMPOSITE = 24 HOURLY
000 G.P.D
HOUR 11 MINUTES
ppm, EFF. 31.6 ppm, RED. 75.45 %
, EFF. 0.2 Mg/l, RED. 99.71 %
, EFF. 239 ppm, RED. 43.6 %
, EFF: 75 ppm

	#2	#3	#1	#2	#3	SUPER
EF BOTTOM			10' OFF BOTTOM			NATANT
9	NG	NG	1.31	.89	.26	.24
4	NG	NG	39.32	41.24	49.13	37.82
6	NG	NG	60.68	58.76	50.39	62.18

B

Operator in Charge
Ralph R. Rader

C

CITY OF MANKATO

SEWAG
MONTHL

GENERAL

Day of Week RIVER	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage INFLUENT	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.
	1	CL	W-NW	47/27	58°	6,402,000		12,200	2.7 s				.94
8.41	2	CL	NE	58/20	57	6,931,000		14,640	3.6 s				.76
7.86	3	C	W-NW	43/22	57	6,578,000		9,760	3.6 s				1.02
7.48	4	C	CALM	50/30	57	6,382,000		8,540	3.3 s				.58
7.15	5	C	SW	51/33	56	6,000,000		10,980	3.5 s				.84
6.84	6	C	S	59/38	57	5,747,000		14,640	92 G / 3.5 s				1.02
	7	P.CL	S-SE	62/40	57	5,341,000		14,640	3.9 s				.94
	8	P.CL	N-NW	65/42	59	5,770,000		17,690	4.4 s				.43
RAIN	9	C	CALM	67/45	54	5,520,000		15,250	3.3 s				.63
RAIN	10	CL	E-SE	63/39	59	5,570,000		18,910	3.6 s				.58
5.84	11	CL	CALM	46/31	58	5,540,000		18,910	4.0 s				.53
	12	P.CL	W-NW	59/34	58	4,509,000		16,470	3.6 s				.85
	13	C	N-NW	62/43	59	4,018,400		16,470	68 G / 2.7 s				.99
	14	C	CALM	60/30	57	4,810,000		15,860	2.8 s				1.05
5.3	15	C	NE	62/36	58	5,370,000		14,640	4.7 s				.63
	16	P.CL	SW	72/38	59	5,238,000		15,860	4.3 s				.49
5.0	17	P.CL	W	77/48	61	5,374,000		15,860	3.9 s				.79
	18	C	SW	85/46	62	5,332,000		14,640	4.4 s				.38
	19	C	N	60/30	60	5,048,000		18,910	4.3 s				.60
	20	C	SW	71/36	60	4,836,000		17,080	81 G / 2.9 s				.79
4.5	21	P.CL	N	65/40	60	4,591,000		15,860	5.1 s				.86
	22	C	NE	78/56	61	5,086,000		16,470	5.0 s				.54
4.4	23	C	SW	79/54	62	5,038,000		17,080	4.0 s				.67
4.3	24	C	NE	80/58	61	5,102,000		14,640	6.0 s				.76
4.3	25	P.CL	SE	92/64	62	5,274,000		13,420	4.9 s				.68
4.2	26	C	SW	85/58	63	5,216,000		12,200	5.6 s				.62
	27	P.CL	S	67/52	63	4,769,000		17,080	67 G / 3.6 s				.71
	28	P.CL	NE	64/46	62	4,386,000		15,860	4.3 s				1.05
4.1	29	P.CL	E-NE	66/52	62	4,860,000		14,670	4.9 s				.63
	30	CL	E-NE	69/50	58	4,360,000		13,420	4.3 s				.97
	31	P.CL	E-SE	73/45	62	4,800,000		14,030	4.0 s				.75
Ave.				65.6/41.2	59.48	5,285,400		15,132	70 G / 4.08 s				.74
Max.				92/64	63	6,931,000		18,910	93 G / 6.0 s				1.05
Min.				43/20	56	4,018,400		8,540	69 G / [illegible]				.38
		Totals				163,446,900		[illegible]	308 G / 127.45 s				

A

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH

GENERAL									DIGESTER NO. 1							DI				
Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. EF.		INFLUENT PH	Temp.	P.h.	Pressure	~~Cu.ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced
	12,200	2.7 s				.94		7.1	95	6.9	4.9	5.0	12,200			94	6.8	4.7	2'6	
	14,640	3.6 s				.76		7.1	95	6.9	4.8	5.0	14,640			94	6.9	4.7	1'8	
	9,760	3.6 s				1.02		7.4	95	6.9	4.7	5.0	9,760			95	7.05	4.6	3'8	
	8,540	3.3 s				.58		7.4	95	6.9	4.9	5.0	8,540			94	7.0	4.8	3'0	
	10,980	3.5 s				.84		7.4	95	7.0	4.6	5.0	10,980			95	6.95	4.6	2'5	
	14,640	92 G / 3.5 s				1.02		7.3	95	7.0	4.4	5.0	14,640			94	7.1	4.3	1'8	
	14,670	3.9 s				.94		7.4	95	6.9	4.7	5.0	14,640			94	6.9	4.6	8"	
	17,690	4.4 s				.43		7.3	95	6.75	4.7	5.0	17,690			93	6.8	4.6	3'5	
	15,250	3.3 s				.63		7.6	95	6.9	5.0	5.0	15,250			94	6.9	4.9	2'2.5	
	18,910	3.6 s				.58		7.5	95	6.8	5.0	5.0	18,910			94	6.9	4.9	1'2	
	18,910	4.0 s				.53		7.2	94	6.85	5.0	5.0	18,910			93	6.9	4.5	3'3.5	
	16,470	3.6 s				.85		7.3	93	6.75	4.7	5.0	16,470			93	6.8	4.5	2'2	
	16,470	68 G / 2.7 s				.99		7.4	93	6.75	4.6	5.0	16,470			94	6.8	4.5	10.5	
	15,860	2.8 s				1.05		7.7	94	6.8	4.7	6.0	15,860			94	6.8	4.6	3'9	
	14,690	4.7 s				.63		7.3	94	6.8	4.7	5.0	14,640			94	6.9	4.5	2'8	
	15,860	4.3 s				.49		7.5	95	6.8	4.9	5.0	15,860			94	6.9	4.7	1'8	
	15,860	3.9 s				.79		7.9	95	6.9	4.5	5.0	15,860			94	7.0	4.4	3'8	
	14,640	4.4 s				.38		7.8	95	6.85	4.9	5.0	14,640			94	7.0	4.8	2'7	
	18,910	4.3 s				.60		7.7	95	6.8	4.7	5.0	18,910			94	6.9	4.6	1'7	
	17,080	81 G / 2.9 s				.79		7.7	95	6.8	5.2	5.0	17,080			94	6.9	5.0	3'6	
	15,860	5.1 s				.86		8.0	95	7.0	4.8	5.0	15,860			94	7.0	4.5	2'4	
	16,470	5.0 s				.54		7.4	95	6.8	5.0	5.0	16,470			94	6.9	4.8	1'3	
	17,080	4.0 s				.67		7.4	94	6.8	4.6	5.5	17,080			94	6.8	4.5	3'4	
	14,640	6.0 s				.74		7.3	94	6.8	4.8	5.5	14,640			94	6.9	4.7	2'2	
	13,420	4.9 s				.68		7.8	95	6.9	4.9	3.5	13,420			94	6.9	4.8	1'2	
	12,200	5.6 s				.62		7.4	94	6.9	4.7	5.0	12,200			94	6.8	4.5	2'10	
	17,080	67 G / 3.6 s				.71		7.3	94	6.9	4.9	5.0	17,080			94	6.9	4.8	1'10	
	15,860	4.3 s				1.05		7.5	95	6.9	5.0	5.0	15,860			94	6.9	4.8	2'3	
	14,640	4.9 s				.63		7.0	95	6.8	5.2	5.0	14,640			94	6.8	5.0	2'2	
	13,420	4.3 s				.97		7.0	95	6.7	4.5	5.0	13,420			94	6.7	5.3	1'2	
	14,030	4.0 s				.75		7.0	95	6.7	5.0	5.0	14,030			94	6.7	4.9	3'3	
	15,132	70 G / 4.02 s				.74		7.42	94.5	6.85	4.79		15,132			93.9	6.89	4.69		
	18,910	93 G / 6.0 s				1.05		8.0	95	7.0	5.2		18,910			95	7.1	5.3		
	8,540	67 G / 2.7 s				.38		7.0	93	6.7	4.4		8,540			93	6.7	4.3		
	469,090	308 G / 124.5 S											469,090							

B

E TREATMENT PLANT
LY OPERATION REPORT

MONTH May 1967

	DIGESTER NO. 1							DIGESTER NO. 2								
Influent PH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		No. Mankato Sewage Flow G.P.D.
7.1	95	6.9	4.9	5.0	12,200			94	6.8	4.7	2'6					886,2
7.1	95	6.9	4.8	5.0	14,640			94	6.9	4.7	1'8			43,920		783,60
7.4	95	6.9	4.7	5.0	9,760			95	7.05	4.6	3'8					730,60
7.4	95	6.9	4.9	5.0	8,540			94	7.0	4.8	3'0					712,40
7.4	95	7.0	4.6	5.0	10,980			95	6.95	4.6	2'5					689,90
7.3	95	7.0	4.4	5.0	14,640			94	7.1	4.3	1'8					673,70
7.4	95	6.9	4.7	5.0	17,640			94	6.9	4.6	8"			54,900		588,80
7.3	95	6.75	4.7	5.0	17,690			93	6.8	4.6	3'5					674,40
7.6	95	6.9	5.0	5.0	15,250			94	6.9	4.9	2'2.5					624,100
7.5	95	6.8	5.0	5.0	18,910			94	6.9	4.9	1'2			52,460		615,300
7.2	94	6.85	5.0	5.0	18,910			93	6.9	4.5	3'3.5					621,90
7.3	93	6.75	4.7	5.0	16,470			93	6.8	4.5	2'2					611,400
7.4	93	6.75	4.6	5.0	16,470			94	6.8	4.5	10.5			56,120		600,400
7.7	94	6.8	4.7	6.0	15,860			94	6.8	4.6	3'9					529,200
7.3	94	6.8	4.7	5.0	17,640			94	6.9	4.5	2'8					628,00
7.5	95	6.8	4.9	5.0	15,860			94	6.9	4.7	1'8			45,170		584,400
7.9	95	6.9	4.5	5.0	15,860			94	7.0	4.4	3'8					617,400
7.8	95	6.85	4.9	5.0	14,640			94	7.0	4.8	2'7					593,200
7.7	95	6.8	4.7	5.0	18,910			94	6.9	4.6	1'7			46,970		576,200
7.7	95	6.8	5.2	5.0	17,080			94	6.9	5.0	3'6					564,800
8.0	95	7.0	4.8	5.0	15,860			94	7.0	4.5	2'4					789,600
7.4	95	6.8	5.0	5.0	16,470			94	6.9	4.8	1'3			46,970		599,000
7.4	94	6.8	4.6	5.5	17,080			94	6.8	4.5	3'4					558,200
7.3	94	6.8	4.8	5.5	14,640			94	6.9	4.7	2'2					552,400
7.8	95	6.9	4.9	3.5	13,420			94	6.9	4.8	1'2			37,820		567,500
7.4	94	6.9	4.7	5.0	12,200			94	6.8	4.5	3'10					545,500
7.3	94	6.9	4.9	5.0	17,080			94	6.9	4.8	1'10			37,820		477,100
7.5	95	6.9	5.0	5.0	15,860			94	6.9	4.8	3'3					420,600
7.0	95	6.8	5.2	5.0	14,640			94	6.8	5.0	2'2					495,000
7.0	95	6.7	4.5	5.0	13,420			94	6.7	5.3	1'2			43,920		435,400
7.0	95	6.7	5.0	5.0	14,630			94	6.7	4.9	3'3					505,100
7.42	94.5	6.85	4.79		15,132			93.9	6.89	4.69				46,607		593,28
8.0	95	7.0	5.2		18,910			95	7.1	5.3				56,120		886,200
7.0	93	6.7	4.4		8,540			93	6.7	4.3				37,820		420,600
					469,090									466,040		18,596,

	DIGESTER NO. 3									SHIFT OPERATORS		
										Int. for Reg. Time and add overtime if any		
Date	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added GAL.	Gals. Digested Sludge Removed To WHERE	ORDER	AVERAGE PH OF RAW SLUDGE	Day	Afternoon	Night
1	71	6.9	4.5	19.5					5.7	GORDY	ROGER	BOB
2	—	—	4.5	38.5					6.1	"	"	NORM
3	77	7.0	4.6	1'2					6.2	RALPH	RAY	"
4	76	7.05	4.7	3'3					6.0	ROGER	"	BOB
5	—		4.5	4'0					6.0	RALPH	RAY/ROGER	"
6	—		4.3	4'0					5.9	GORDY	HARV	"
7	—		4.5	4'0					5.8	"	"	"
8	77	6.8	4.5	0'3					5.5	ROGER	RAY	"
9	76	7.0	4.7	0'3					5.7	"	"	"
10	77	6.9	4.7	3'2					5.8	"	GORDY	MONTY
11	77	6.9	4.4	0'6					5.7	"	"	"
12	76	6.8	4.4	3'6					5.7	ROGER/HARV	"	BOB
	—		4.4	0'1					5.9	ROGER	"	"
14	78	6.9	4.4	0'3					5.9	"	"	"
15	76	6.9	4.4	0'4					6.0	RAY	"	"
16	76	6.9	4.6	3'3					5.8	RAY	"	"
17	81	7.0	4.3	1'0					6.1	"	ROGER	"
18	79	6.95	4.7	1'0					6.0	"	"	MONTY
19	—	—	4.4	3'8					6.1	"	"	"
20	80	6.85	4.9	0'8					6.1	"	"	BOB
21	78	7.0	4.4	0'6					6.3	"	"	"
22	76	6.9	4.8	2'7		12,200	ART JACOBS	H.H.	6.2	GORDY	"	"
23	77	6.8	4.4	0'7		15,860	" "	H.H.	5.9	"	"	"
24	78	6.9	4.6	2'4					6.0	"	RAY	"
25	79	6.8	4.6	2'4					5.8	"	"	"
26	80	6.8	4.4	0'9					5.9	"	"	MONTY
27	78	6.8	4.7	3'0					6.0	"	"	"
28	79	7.0	4.7	1'2					6.1	"	"	BOB
29	80	6.8	4.9	1'2					6.0	ROGER	"	"
30	78	6.75	5.2	3'0					5.8	"	"	"
31	80	6.7	4.8	1'4					5.9	"	GORDY	"
Ave.	79.6	6.88	4.58						5.93			
Max.	81	7.05	5.2						6.3			
Min.	71	6.7	4.3						5.5			
Totals						28,060						

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

Mon
COMPOSITE S
INF. = 8:00
EFF. = 8:00
FLOW = 5, 102,
CLARIFIER TIM
B. O. D. = INF. 10
SED. S. = INF. 5
SUSP. S. = INF. 9
PH = INF. 7.

5-18-67	RAW SLUDGE	#1	#2	#3
		BOTTOM		
% TOTAL SOLIDS	4.03	38.38	19.55	6.63
% FIXED "	19.77	75.37	55.76	42.45
% VOLATILE "	80.23	24.65	44.24	57.55

OPERATORS	
Reg. Time and overtime if any	
Afternoon	Night
Roger	Bob
"	Norm
Ray	"
"	Bob
Ray/Roger	"
Horv	"
"	"
Ray	"
"	"
Gordy	Monty
"	"
"	Bob
"	"
"	"
"	"
"	"
Roger	"
"	Monty
"	"
"	Bob
"	"
"	"
"	"
Ray	"
"	"
"	Monty
"	"
"	Bob
"	"
"	"
Gordy	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

Monthly Test (5-24-67)
Composite Samples - Hourly
Inf. = 8:00 A.M. → 4:00 P.M.
Eff. = 8:00 A.M. → 8:00 A.M. (24 Hour)
Flow = 5,102,000 G.P.D.
Clarifier Time = 3 Hr. 17 Min.
B.O.D. = Inf. 161.25 ppm, Eff. 66.84 ppm, Red. 58.52%
Sed. S. = Inf. 5.0 Ml/l, Eff. 0.02 Ml/l, Red 99.6 %
Susp. S. = Inf. 290 ppm, Eff. 134 ppm, Red. 53.8 %
Ph = Inf. 7.4, Eff 7.35

5-18-67	Raw Sludge	#1	#2	#3	#1	#2	#3	#1	#2	#3	Super Natant
		Bottom			5' Off Bottom			10' Off Bottom			
% Total Solids	4.03	38.38	18.55	6.63	1.19	4.43	.21	1.29	.94	.21	.20
% Fixed "	19.77	25.37	55.76	42.45	42.94	73.99	52.36	40.76	44.13	52.29	51.79
% Volatile "	80.23	74.63	44.24	57.55	57.06	26.01	47.64	59.24	55.87	47.72	48.21

REMARKS

5-2-67 Heat Exchanger Water Pr
Added 1 pt Of Boiler C
5-11-67 Tour - St Clair School (C
5-13-67 Tour - Boy Scouts - 3
5-16-67 Rec. 5 Full Cl2 Cyl. - Hawk
Returned 5 Empty's Hawk
5-21-67 P.H. Machine Out Of Ord
5-22-67 " " Appears O
Trouble Seems To Be In Ou
5-12+13-67 Sewage Flow = Pump Hours - Me

No Mankato Sewage
Our Meter = 18,546,700
Their " = 17,309,000

City Gas Meter
Gas Used In May = 118,200

Chlorine
5-16-67 Received 5 Full Hawk
Returned 5 Empty Hawk

Operator in Charge
Ralph R. Ra

To

. 1
Days
to
. 2
Days
to
. 3
Days
to
. 4
Days
to
. 5
days
to
to

Monthly Test (5-24-67)
e Samples - Hourly
8:00 A.M. → 4:00 P.M.
8:00 A.M. → 8:00 A.M. (24 Hour)
102,000 G.P.D.
Time = 3 HR. 17 MIN.
Inf. 161.25 ppm, Eff. 66.84 ppm, Red. 58.52%
Inf. 5.0 Ml/l, Eff. 0.02 Ml/l, Red 99.6%
Inf. 290 ppm, Eff. 134 ppm, Red. 53.8%
Inf. 7.4, Eff 7.35

#3	#1	#2	#3	#1	#2	#3	Super
	5' Off Bottom			10' Off Bottom			Natant
6.63	1.19	4.43	.21	1.29	.74	.21	.20
2.45	47.94	73.99	52.36	40.76	44.13	52.28	51.79
7.55	52.06	26.01	47.64	59.24	55.87	47.72	48.21

REMARKS

5-2-67 Heat Exchanger Water PH 7.9, Hardness 6 gr/gal
Added 1 pt Of Boiler Compond
5-11-67 Tour - St Clair School (45 People)
5-13-67 Tour - Boy Scouts - 3
5-16-67 Rec. 5 Full Cl2 Cyl. - Hawkins
Returned 5 Empty's Hawkins
5-21-67 P.H. Machine Out Of Order
5-22-67 " " Appears OK
Trouble Seems To Be In Old Buffer
5-12+13-67 Sewage Flow = Pump Hours - Meter Acting Up

No Mankato Sewage Flow
Our Meter = 18,546,700 Diff. 6.67%
Their " = 17,309,000

City Gas Meter
Gas Used In May = 118,200 Cu. Ft.

Chlorine
5-16-67 Received 5 Full Hawkins
Returned 5 Empty Hawkins

Operator in Charge Ralph R. Rader

CITY OF MANKATO

SEWAGE TREA
MONTHLY OPER

GENERAL

Day of Week River	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage Influent	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. Ef.		Influent P.H.	Temp.
	1	C	E-NE	74/41	62	3-881-400		22,570	5.1 s				.64		7.5	95
	2	C	CALM	82/50	62	3-618-000		21,960	5.3 s				.41		7.7	95
	3	C	S-SE	82/58	63	3-546-000		15,460	96G / 3.9 s				.81		7.6	95
3.87	4	CL	CALM	49/54	61	3-391-200		15,460	3.8 s				.80		7.8	95
	5	CL	E	95/55	62	3-917-400		13,420	5.6 s				.66		7.7	95
3.79	6	P-CL	SE	78/54	62	3-808-200		15,860	5.3 s				.56		7.5	95
	7	CL	E	76/52	63	4-412-400		16,470	5.6 s				.50		7.7	95
	8	CL	SW	94/53	62	4-095-600		17,080	4.4 s				.85		8.05	95
4.13	9	CL	NE	71/54	63	3-856-200		19,520	5.1 s				.74		7.6	95
	10	CL	NW	76/52	63	3-483-000		15,460	94G / 3.2 s				.83		7.7	95
	11	CL	NE	64/64	62	3-711-000		14,945	7.5 s				.74		8.0	95
	12	CL	SE	81/63	62	4-325-400		17,080	4.3 s				.49		7.5	95
	13	P-CL	CALM	79/68	63	4-216-200		13,420	4.0 s				1.01		7.4	95
10.16	14	P-CL	SW	86/65	63	4-621-800		13,420	3.6 s				.64		7.4	95
11.93	15	P-CL	SE	98/64	63	6-040-400		15,860	6.0 s				–		7.3	95
13.85	16	C	SW	79/58	64	4-954-200		15,860	4.0 s				.67		7.3	95
15.4	17	C	NE	74/57	63	5-074-800		15,860	71G / 2.6 s				.75		7.4	95
	18	C	CALM	72/52	64	4-585-200		14,030	3.8 s				.81		7.4	95
	19	CL	E-NE	76/56	65	4-915-800		12,810	4.5 s				.79		6.9	95
14.55	20	C	S-SW	81/53	62	4-216-200		14,030	4.0 s				.70		7.1	95
	21	C	W-NW	72/52	63	4-114-800		16,470	4.5 s				.94		7.5	95
12.5	22	C	N-NW	80/52	62	4-423-200		20,770	4.0 s				.51		7.6	95
	23	C	N-NW	67/47	63	4-144-800		16,470	4.5 s				.76		7.7	95
	24	CL	CALM	63/46	61	3-744-000		13,420	78G / 2.9 s				.76		7.2	95
	25	C	W-SW	79/[illegible]	60	3-245-400		16,470	2.7 s				.74		7.7	95
	26	CL	SW	79/[illegible]	62	4-629-000		14,640	4.7 s				.28		7.6	95
10.85	27	P-CL	S	80/53	63	3-712-000		12,040	4.3 s				.65		8.0	95
10.70	28	C	SW	83/60	63	3-939-600		18,300	4.1 s				.54		7.8	95
11.40	29	P-CL	SW	88/64	64	4-038-400		17,640	4.3 s				.65		7.7	95
11.60	30	C	SW	97/61	63	4-000-800		15,860	4.0 s				.63		7.4	95
	31															
Ave.						4-143-000		16,196	80G / 4.4 s				.71		7.58	95
Max.						6-040-400		22,570	97G / 5.5 s				1.01		8.0	95
Min.						3-245-400		12,810	71G / 2.7 s				0.0		6.9	95
		Totals				124,292,400		413,965	321G / 132.1 s							

A

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH June 196

	B.O.D.					DIGESTER NO. 1							DIGESTER NO. 2						
Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF.		Influent P.H.	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3
			.64		7.5	95	6.65	5.0	5.0	22,570			94	6.7	4.95	2.5			
			.41		7.7	95	6.65	4.8	5.0	21,960			94	6.6	4.7	0.9			54,900
			.81		7.6	95	6.6	5.2	5.0	15,860			94	6.65	5.0	3.0			
			.80		7.8	95	6.95	5.2	6.0	15,860			94	6.9	5.0	1.11			36,600
			.66		7.7	95	7.0	5.1	5.0	13,420			94	7.0	5.0	3.4			
			.56		7.5	95	6.9	4.6	5.0	15,860			94	6.9	4.5	2.5			
			.50		7.7	95	7.0	5.0	5.0	16,470			94	7.0	4.8	1.4			46,970
			.85		8.05	95	6.9	4.8	5.0	17,080			94	7.0	4.6	3.5			
			.74		7.6	95	7.0	5.0	5.0	19,520			94	7.0	4.8	2.3			39,040
			.83		7.7	95	7.0	5.2	5.0	15,860			94	7.0	4.9	3.7			
			.74		8.0	95	6.9	4.4	5.0	14,945			94	7.0	4.8	2.6			13,725
			.49		7.5	95	6.7	4.8	5.0	17,080			94	6.7	4.8	2.5			
			1.01		7.4	95	7.0	4.9	5.0	13,420			94	7.0	4.8	1.3			48,800
			.64		7.4	95	7.0	4.9	5.0	13,420			94	6.9	4.7	3.8			
			–		7.3	95	6.8	4.8	5.0	15,860			94	6.9	4.7	2.9			
			.67		7.3	95	6.8	4.6	5.0	15,860			94	6.9	4.4	1.8			43,920
			.75		7.4	95	6.4	4.9	5.0	15,560			94	7.0	4.8	3.7			
			.81		7.4	95	7.0	4.9	5.0	14,630			94	6.9	4.8	2.6			
			.79		6.9	95	6.9	4.9	5.0	12,810			94	6.75	4.7	1.5			41,480
			.70		7.1	95	6.85	5.0	5.0	14,030			94	6.9	4.9	3.6			
			.94		7.5	95	6.95	4.7	5.0	16,470			94	7.0	4.6	2.5			
			.51		7.6	95	7.0	4.6	5.0	20,740			94	7.0	4.5	1.5			34,160
			.76		7.7	95	7.0	5.0	5.0	16,470			94	7.0	4.5	2.4			
			.76		7.2	95	6.4	4.7	5.0	13,420			94	7.0	4.5	1.25			43,920
			.74		7.7	95	7.0	4.6	5.0	16,470			94	7.0	4.5	3.35			
			.28		7.6	95	7.0	4.6	5.0	14,640			94	6.95	4.4	2.2			
			.65		8.0	95	7.0	5.6	5.0	17,080			94	7.05	4.8	2.2			54,900
			.54		7.8	95	7.0	4.9	5.0	18,300			94	7.0	4.7	3.9			
			.65		7.7	95	7.0	5.1	5.0	14,640			94	7.0	4.4	2.6			
			.63		7.4	95	6.45	5.0	5.0	15,860			94	7.0	4.8	1.6			52,460
			.71		7.58	95	6.9	4.99	5.0	16,196			94	6.92	4.74				42,573
			1.01		8.0	95	7.0	5.2	6.0	22,570			94	7.05	5.0				54,900
			0.0		6.9	95	6.6	4.6	5.0	12,810			94	6.6	4.4				13,725
										485,865									510,875

ATMENT PLANT
ERATION REPORT

MONTH June 1967

DIGESTER NO. 1							DIGESTER NO. 2								
Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		No. MANKATO SEWAGE FLOW G.P.D.
95	6.65	5.0	5.0	22,570			94	6.7	4.95	2'3					497-900
95	6.65	4.8	5.0	21,960			94	6.6	4.7	0'9			54,900		498-600
95	6.6	5.2	5.0	15,860			94	6.65	5.0	3'0					481-400
95	6.95	5.2	6.0	15,860			94	6.9	5.0	1'11			36,600		429-800
95	7.0	5.1	5.0	13,420			94	7.0	5.0	3'4					506-400
95	6.9	4.6	5.0	15,860			94	6.9	4.5	2'5					509-200
95	7.0	5.0	5.0	16,470			94	7.0	4.8	1'4			46,970		543-400
95	6.9	4.8	5.0	17,080			94	7.0	4.6	3'5					530-600
95	7.0	5.0	5.0	19,520			94	7.0	4.8	2'3			39,040		523-600
95	7.0	5.2	5.0	15,860			94	7.0	4.9	3'7					501-600
95	6.9	4.4	5.0	14,945			94	7.0	4.8	2'6			13,725		445-900
95	6.7	4.8	5.0	17,080			94	6.7	4.8	2'5					563-400
95	7.0	4.9	5.0	13,420			94	7.0	4.8	1'3			48,800		536-000
95	7.0	4.9	5.0	13,420			94	6.9	4.7	3'8					583-100
95	6.8	4.8	5.0	15,860			94	6.9	4.7	2'9					615-200
95	6.8	4.6	5.0	15,860			94	6.9	4.4	1'8			43,920		642-000
95	6.4	4.9	5.0	15,860			94	7.0	4.8	3'7					646-500
95	7.0	4.9	5.0	14,030			94	6.9	4.8	2'6					603-700
95	6.9	4.9	5.0	12,810			94	6.75	4.7	1'6			41,480		712-200
95	6.85	5.0	5.0	14,030			94	6.9	4.9	3'6					654-500
95	6.95	4.7	5.0	16,470			94	7.0	4.6	2'6					638-500
95	7.0	4.6	5.0	20,740			94	7.0	4.5	1'5			34,160		661-600
95	7.0	5.0	5.0	16,470			94	7.0	4.5	2'4					618-400
95	6.4	4.7	5.0	13,420			94	7.0	4.5	1'2			43,920		611-900
95	7.0	4.6	5.0	16,470			94	7.0	4.5	3'3					539-000
95	7.0	4.6	5.0	14,640			94	6.95	4.4	2'2					640-400
95	7.0	5.0	5.0	17,080			94	7.05	4.8	2'2			54,900		636-800
95	7.0	4.9	5.0	18,300			94	7.0	4.7	3'9					658-000
95	7.0	5.1	5.0	14,640			94	7.0	4.4	2'6					660-200
95	6.95	5.0	5.0	15,860			94	7.0	4.8	1'6			52,460		666-600
							*								
95	6.9	4.89	5.0	16,196			94	6.92	4.74				42,573		579-860
95	7.0	5.2	6.0	22,570			94	7.05	5.0				54,900		712-200
95	6.6	4.6	5.0	12,810			94	6.6	4.4				13,725		429-800
				485,965									510,875		17-395-8

(1

Date	DIGESTER NO. 8									SHIFT OPERATORS Int. for Reg. Time and add overtime if any		
	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		Average PH Raw Sludge	Day	Afternoon	Night
1	80	6.75	4.8	1'4.5					6.1	Roger	Gordy	Bob
2		-	4.4	4'3					5.9	"	"	"
3	84	6.75	4.9	0'6					6.0	"	"	Monty
4	82	6.9	4.9	1'9					6.1	"	"	Rose
5	83	6.8	4.9	0'5					6.0	Ray	"	"
6	83	6.8	4.4	2'1					6.0	"	"	"
7	-	-	4.7	4'3					6.0	"	Roger	"
8	81	6.8	4.5	1'2					6.1	"	"	"
9	82	6.8	4.6	2'6					6.2	"	"	Bob
10	83	6.85	4.8	11"					6.2	"	"	"
11	84	7.0	4.6	2'3					6.1	"	"	Rich
12	82	6.8	4.6	2'4					6.1	Gordy	"	"
13	-	-	4.7	3'9					6.1	"	"	Bob
14	83	6.9	4.6	10"					5.7	"	Ray	"
15	82	6.8	4.6	10"					5.9	"	"	"
16	-	-	4.4	3'6					5.9	"	"	"
17	82	6.9	4.7	1'3					5.8	"	"	"
18	81	7.0	4.6	1'2					6.0	"	"	"
19	83	6.8	4.7	3'2					5.8	Roger	"	Norm
20	82	6.95	4.7	1'1					5.9	"	"	"
21	82	7.0	4.5	1'2					6.0	"	Gordy	Bob
22	82	7.0	4.8	1'6					6.0	"	"	"
23	84	7.0	4.4	6"					6.0	"	"	"
24	82	7.0	4.4	2'2					6.1	"	"	"
25	80	7.0	4.4	6"					6.1	Roger | Harv	"	"
26	83	6.85	4.3	7"					6.2	Ray	"	"
27	83	7.0	4.7	3'0					6.2	"	"	Norm
28	85	6.9	4.7	3"					6.2	"	Harv	"
29	84	6.85	4.7	2'3					6.1	"	"	Bob
30	-	-	4.7	4'0					6.1	"	"	"
31												
Ave.	82.5	6.88	4.62						6.03			
Max.	85	7.0	4.4						6.2			
Min.	80	6.75	4.3						5.7			
Totals												

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

Monthly T
Composite Samples =
Inf. - 8:00 A.M. → 4
Eff. - 8:00 A.M → 8
Flow = 4,423,200 G
Clarifier Time = 3
B.O.D. = Inf. 200 ~~ppm~~, E
Sep. S. = Inf. 6 ml/l , E
Susp. S. = Inf. 40.2 ~~ppm~~, E
Turb. = Inf. 75 ~~ppm~~, E
P.H. = Inf. 7.85 , E

6-27-67	Raw Sludge	#1	#2	#3	#1	#2
		Bottom			5' Off Bo	
% Total Solids	4.52	14.59	29.4	7.58	1.53	.73
% Fixed	20.43	73.33	71.64	43.1	39.63	41.31
% Volatile	79.57	26.67	28.36	56.9	60.37	58.6

243 244

T OPERATORS

for Reg. Time and
overtime if any

Afternoon	Night
GORDY	BOB
"	"
"	MONTY
"	ROSE
"	"
"	"
ROGER	"
"	"
"	BOB
"	"
"	RICH
"	"
"	BOB
RAY	"
"	"
"	"
"	"
"	"
"	NORM
"	"
GORDY	BOB
"	"
"	"
"	"
"	"
"	"
"	NORM
HARV	"
"	BOB
"	"

Cu. Ft. Digested
Sludge Pumped To
This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

MONTHLY TEST (6-22-67)
COMPOSITE SAMPLES = HOURLY
INF. – 8:00 A.M. → 4:00 P.M.
EFF. – 8:00 A.M → 8:00 A.M.
FLOW = 4,423,200 G.P.D.
CLARIFIER TIME = 3 HR. 57 MIN.
B.O.D. = INF. 200 ~~ppm~~, EFF. 88.75 ~~ppm~~, RED. 55.63 %
SET. S. = INF. 6 ML/L, EFF. 0.5 ML/L, RED 91.66 %
SUSP. S. = INF. 46.2 ~~ppm~~, EFF. 51 ~~ppm~~, RED NONE (RUN BY NALCO)
TURB. = INF. 75 ~~ppm~~, EFF. 53 ~~ppm~~, RED. 29.33 %
P.H. = INF. 7.85, EFF. 7.6

6-27-67	RAW SLUDGE	#1 BOTTOM	#2	#3	#1 5' OFF BOTTOM	#2	#3	#1 10' OFF BOTTOM	#2	#3	SUPER NATANT
% TOTAL SOLIDS	4.52	14.59	29.4	7.58	1.53	.73	2.48	1.34	.78	.17	.19
% FIXED	20.43	73.33	71.64	43.1	39.63	41.31	42.17	40.93	38.24	48.75	36.17
% VOLATILE	79.57	26.67	28.36	56.9	60.37	58.69	57.83	59.07	61.76	51.25	63.83

B

REMARKS

6-1-67 FOUND CRACKED SLEEVE ON #2
WHILE REPACKING SAME – CRACK
PACKING – WILL WATCH SAME
6-1 BOILER WATER – HARDNESS 9 GRS
HEAT EXCHANGER " 6 "
ADDED BOILER COMPOUND TO BO
6-2- SIMPLEX NOT ACCURATE – USING
FOR TOTAL FLOW
6-16 } 6-12 } NALCO CHEM. CO. FEEDING "NALCO
THE PLANT
6-20-67 REC. NEW (TO US) TYPEWRITER FRO
6-22 TOUR 4 SCOUTS + ASST. CITY E
6-29- REC. 3 CYLS OF CHLORINE F
SHORT 2 CYLS – WILL REC. NEXT

NO. MANKATO SEWAGE
OUR METER = 17,395,800 G.P.D.
THEIR " = 17,073,800 G.P.D.

CITY GAS METER
6-1-67 9,244,100 } GAS USED
7-1-67 9,271,800 } 27,700 CU

CHLORINE
6-29-67 REC 3 FULL CYL. F

Operator in Charge

Ralph R. Fader

REMARKS

6-1-67 Found Cracked Sleeve On #2 Main Pump
While Repacking Same - Crack Did Not Harm
Packing - Will Watch Same

6-1 Boiler Water - Hardness 9 Grs/Gal, Ph 8.7
Heat Exchanger " 6 " " , " 8.0
Added Boiler Compound To Both

6-2- Simplex Not Accurate - Using Pump Hours
For Total Flow

6-16
6-12 } Nalco Chem. Co. Feeding Nalco 675 Thru
The Plant

6-20-67 Rec. New (To Us) Typewriter From Water Dept.

6-22 Tour 4 Scouts + Asst. City Eng.

6-29- Rec. 3 Cyls Of Chlorine From Jones (T.H.)
Short 2 Cyls - Will Rec. Next Week

No. Mankato Sewage Flow

Our Meter = 17,395,800 G.P.D.
Their " = 17,073,800 G.P.D.

City Gas Meter

6-1-67 9,244,100 } Gas Used In June
7-1-67 9,271,800 } 27,700 Cu. Ft.

Chlorine

6-29-67 Rec 3 Full Cyl. From Jones (T.H.)

ys

ys

ys

ys

ys

Monthly Test (6-22-67)
Samples = Hourly
00 A.M. → 4:00 P.M.
00 A.M → 8:00 A.M.
423,200 G.P.D.
Time = 3 HR. 57 MIN.
200 ppm, Eff. 88.75 ppm, Red. 55.63 %
6 ml/l , Eff. 0.5 ml/l, Red 91.66 %
46.2 ppm, Eff. 51 ppm , Red None (Run By Nalco)
75 ppm, Eff. 53 ppm , Red. 29.33 %
9.85 , Eff. 7.8

	#1	#2	#3	#1	#2	#3	Sups
	5' Off Bottom			10' Off Bottom			Nothing
8	1.53	.73	2.48	1.34	.78	.17	.19
1	39.63	41.31	42.17	40.93	38.24	48.75	36.17
9	60.37	58.69	57.83	59.07	61.76	51.25	63.83

Operator in Charge Ralph R. Pader

CITY OF MANKATO

SEWA
MONTH

GENERAL

Day of Week RIVER	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage INFLUENT	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. EF.
	1	Ch	NW	77/54	63°	3,358,200	~~17,080~~	17,080	3.7 s				.74
10.53	2	PCh	NW	68/49	64	2,864,400		14,640	906/3.2 s				.71
10.15	3	Ch	NE	66/42	63	3,232,200		13,420	4.0 s				.96
9.5	4	PCh	Calm	66/46	61	2,930,400		17,080	3.5 s				.96
	5	C	SE	78/54	62	3,481,200		15,860	4.3 s				.79
8.43	6	C	Calm	81/59	63	3,549,600		12,200	4.4 s				.60
8.1	7	PC	SE	83/64	63	3,745,800		15,860	4.3 s				.47
7.5	8	Ch	S	78/66	62	5,863,200		7,320	816/5.2 s				.51
	9	PC	SE	81/67	64	3,487,000		17,080	4.3 s				.81
8.85	10	C	W-NW	91/69	65	4,617,600		15,250	5.3 s				.33
8.73	11	C	N-NW	81/8	66	4,146,000		13,960	3.2 s				.56
8.3	12	C	N-NW	72/50	66	3,798,000		15,250	3.2 s				.51
	13	PCh	N-NE	70/48	63	3,798,000		14,030	3.3 s				.54
7.9	14	C	Calm	77/49	63	3,576,000		13,420	3.2 s				.60
	15	C	S SE	86/60	64	3,480,000		15,250	896/2.6 s				.68
	16	Ch	E-SE	82/54	62	3,275,400		14,640	4.3 s				1.19
5.94	17	C	Calm	87/54	62	3,900,000		14,640	4.4 s				.53
	18	C	Calm	89/60	63	3,770,400		14,640	3.3 s				.54
5.1	19	C	Calm	92/66	62	3,439,200		18,300	3.6 s				.60
5.0	20	PCh	Calm	92/68	62	3,783,000		21,350	4.1 s				.52
	21	PCh	SE	91/66	63	3,772,800		17,080	3.9 s				.47
4.4	22	PCh	S	93/62	62	3,453,000		13,420	946/2.9 s				.82
	23	C	SW	86/61	62	2,959,200		14,640	3.9 s				.78
4.2	24	C	NW	84/66	65	3,711,000		19,520	3.6 s				.69
4.1	25	C	S	91/68	67	3,558,600		15,860	3.7 s				.71
3.9	26	C	Calm	80/57	67	3,419,400		14,640	4.0 s				.52
3.8	27	PCh	NW	79/51	67	3,298,800		18,300	4.0 s				.76
3.7	28	C	Calm	82/61	65	3,276,600		17,690	4.1 s				.50
3.6	29	C	Calm	92/59	66	3,136,800		14,640	906/3.2 s				.68
3.6	30	PCh	N	83/50	65	2,934,600		14,640	3.6 s				.67
3.5	31	C	W-NW	89/69	66	3,263,000		13,420	4.3 s				.41
Ave.				81.7/57.7	63.8	3,620,900		15,254	886/3.8 s				.64
Max.				93/68	67	5,863,200		21,350	946/3.3 s				1.19
Min.				66/42	61	2,864,800		7,320	816/1.6 s				.33
		Totals				112,248,800		472990	4470/117.6 s				

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH Ju

			B.O.D.					DIGESTER NO. 1							DIGESTER NO. 2						
G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Inf.	Fl.	Ch. Res. EF.		INFLUENT PH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed
080	3.7 s				.74		7.6	95	7.05	4.9	5.0	12,080			94	7.1	4.7	4'2			
240	906/3.25 s				.71		7.8	95	7.0	4.9	4.0	14,640			94	7.0	4.8	2'10			
420	4.0 s				.96		7.3	95	6.9	4.8	5.5	13,720			95	7.0	4.7	1'10			
080	3.5 s				.96		7.2	94	7.0	4.7	5.5	12,080			94	7.0	4.6	11"			58
960	4.3 s				.79		7.2	95	7.0	4.8	6.0	15,860			94	7.1	4.6	3'9			
200	4.4 s				.60		7.3	95	6.9	5.0	6.5	12,200			94	7.0	4.8	2'8			
860	4.3 s				.77		7.4	94	7.0	4.5	6.5	15,860			94	7.6	4.4	1'16			40,
320	816/5.23 s				.56		7.3	95	7.0	4.6	5.0	7,320			94	7.0	4.5	3'6			
080	4.3 s				.81		7.3	94	7.1	4.4	6.0	17,080			94	7.1	4.3	3'			
250	5.3 s				.33		7.6	94	6.9	4.7	6.0	15,250			93	6.9	4.6	1'10			40
460	3.2 s				.56		7.6	94	7.0	4.6	6.0	15,860			94	7.1	4.5	3'25			
250	3.2 s				.51		7.5	95	6.85	4.8	6.0	15,250			94	6.8	4.7	2'55			
030	3.3 s				.54		7.6	95	6.95	4.8	8.5	14,030			94	6.95	4.7	1'5			53
420	3.2 s				.60		7.8	95	7.0	4.7	6.0	13,420			94	6.95	4.6	4'4.5			
250	396/2.6 s				.68		7.8	95	7.0	4.7	7.0	15,250			94	7.0	4.6	3'25			
240	4.3 s				1.19		7.5	95	6.95	4.7	8.0	14,640			94	6.95	4.6	2'2			
440	4.4 s				.53		7.7	95	7.0	4.9	7.0	14,640			94	7.0	4.8	1'2			53
240	3.3 s				.54		7.8	95	7.05	4.8	9.0	14,640			94	7.1	4.7	3'10			
300	3.6 s				.60		9.8	95	7.0	4.9	8.5	18,300			94	7.05	4.7	2'10			
350	4.1 s				.82		7.5	95	6.95	4.9	9.0	21,350			94	7.0	4.8	1'7			46
680	3.9 s				.47		7.7	94	6.95	5.0	9.0	17,080			94	7.05	4.8	3'4			
420	946/2.93 s				.82		7.9	94	6.95	4.9	9.0	13,420			94	6.95	4.8	2'2			34
240	3.9 s				.78		7.5	94	6.95	5.0	9.0	14,640			94	7.0	4.8	3'7			
520	3.6 s				.64		7.5	94	6.9	4.8	5.0	14,520			94	7.0	4.7	2'7			
860	3.7 s				.71		7.6	94	6.9	4.9	5.0	15,860			94	7.0	4.6	1'3			4
240	4.0 s				.52		7.6	94	6.9	4.9	9.0	14,640			94	7.0	4.7	3'6			
300	4.0 s				.76		7.6	95	7.0	4.8	8.0	18,300			94	7.0	4.7	2'6			
640	4.1 s				.50		7.1	94	7.0	5.0	8.5	14,640			95	7.0	4.8	1'3			4
640	906/3.23 s				.68		7.7	95	7.0	4.9	8.0	14,640			94	6.9	4.7	3'3			
640	3.6 s				.67		7.4	95	7.0	4.8	9.0	14,640			94	7.0	4.7	2'3			
420	4.3 s				.41		7.2	95	7.0	4.9	9.0	13,420			95	7.0	4.4	1'3			4
884	8890/3.8 s				.64		7.59	94.6	6.97	4.8	6.95	15,289			94	7.0	4.67				46
350	946/2.93 s				1.14		9.1	95	7.1	5.0	9.0	21,350			95	7.1	4.4				5
320	816/1.6 s				.33		7.2	94	6.85	4.4	4.0	7,320			93	6.8	4.3				4
3930	4440/117.63											423,990									4

TREATMENT PLANT
OPERATION REPORT

MONTH July 1967

	DIGESTER NO. 1							DIGESTER NO. 2								
PH	Temp.	P.h.	Pressure	~~Cu. ft. Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		NO MANKATO SEWAGE FLOW G.P.D.
.6	95	7.05	4.9	5.0	17,080			94	7.1	4.7	4'2					584,600
.8	95	7.0	4.9	4.0	14,640			94	7.0	4.8	2'10					518,300
.3	95	6.9	4.8	5.5	13,420			95	7.0	4.7	1'10					569,700
.2	94	7.0	4.7	5.5	17,080			94	7.0	4.6	11"			58,560		525,800
.2	95	7.0	4.8	6.0	15,860			94	7.1	4.6	3'4					603,000
.3	95	6.9	5.0	6.5	12,200			94	7.0	4.8	2'8					669,000
.4	94	7.0	4.5	6.5	15,860			94	7.6	4.4	1'10			40,260		695,200
.3	95	7.0	4.6	5.0	7,320			94	7.0	4.5	3'6					858,100
.3	94	7.1	4.4	6.0	17,080			94	7.1	4.3	3'					684,600
.6	94	6.9	4.7	6.0	15,250			93	6.9	4.6	1'10			40,260		830,900
.6	94	7.0	4.6	6.0	15,860			94	7.1	4.5	3'6.5					739,800
.5	95	6.85	4.8	6.0	15,250			94	6.8	4.7	3'5.5					691,006
.6	95	6.95	4.8	8.5	14,030			94	6.95	4.7	1'5			53,680		691,200
.8	95	7.0	4.7	6.0	13,420			94	6.95	4.6	4'4.5					685,600
.8	95	7.0	4.7	7.0	15,250			94	7.0	4.6	3'2.5					682,400
.5	95	6.95	4.7	8.0	14,640			94	6.95	4.6	2'2					586,000
.7	95	7.0	4.9	7.0	14,640			94	7.0	4.8	1'2			53,680		690,600
.8	95	7.05	4.8	7.0	14,640			94	7.1	4.7	3'10					645,400
.8	95	7.0	4.9	8.5	18,300			94	7.05	4.7	2'10					641,000
.5	95	6.95	4.9	9.0	21,350			94	7.0	4.8	1'7			46,970		603,400
.7	94	6.95	5.0	9.0	17,080			94	7.05	4.8	3'4					590,600
.9	94	6.95	4.9	9.0	13,420			94	6.95	4.8	2'2			34,160		568,000
.5	94	6.95	5.0	[illegible].0	14,640			94	7.0	4.8	3'7					459,700
.5	94	6.9	4.8	5.0	14,520			94	7.0	4.7	2'7					567,300
.6	94	6.9	4.9	5.0	15,860			94	7.0	4.6	1'3			48,800		530,100
.6	94	6.9	4.9	7.0	14,640			94	7.0	4.7	3'6					524,500
.6	95	7.0	4.8	8.0	18,300			94	7.0	4.7	2'6					498,000
.1	94	7.0	5.0	8.5	14,640			95	7.0	4.8	1'3			43,920		501,200
.7	95	7.0	4.9	8.0	14,640			94	6.9	4.7	3'3					516,700
.4	95	7.0	4.8	9.0	14,640			94	7.0	4.7	2'3					445,500
.2	95	7.0	4.9	9.0	13,420			95	7.0	4.4	1'3			43,920		551,300
.59	94.6	6.97	4.8	6.95	15,289			94	7.0	4.67				46,421		614,200
.1	95	7.1	5.0	9.0	21,350			95	7.1	4.8				58,566		858,100
.2	94	6.85	4.4	4.0	7,320			93	6.8	4.3				40,260		445,500
					473,990									464,210		19,949.4

C

	DIGESTER NO. 8									SHIFT OPERATORS			
										Int. for Reg. Time and add overtime if any			Cu. Ft. Digested Sludge Pumped To This Month
													Drying Bed No. 1
													Drying Time –Days
Date	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		RAW SLUDGE AVERAGE PH	Day	Afternoon	Night	Final Disposal to
1	85	6.9	4.6	8"					6.2	RAY	HARV.	BOB	Drying Bed No. 2
2	84	6.9	4.7	2'7					6.0	''	''	''	Drying Time –Days
3	–	–	4.6	4'3					6.1	GORDY	''	''	Final Disposal to
4	–	–	4.5	4'3					6.0	''	''	''	
5	80	7.0	4.5	3"					6.1	''	RAY	NORM	Drying Bed No. 3
6	82	7.1	4.7	3"					6.1	''	''	''	Drying Time—Days
7	82	7.1	4.3	3'					6.1	''	''	BOB	Final Disposal to
8	79	7.1	4.3	10"					6.2	''	''	RICH	
9	78	7.0	–	10"					6.1	''	''	BOB	Drying Bed No. 4
10	82	7.1	2.1	3'2					6.2	ROGER	''	''	Drying Time –Days
11	84	7.1	4.4	1'0					6.1	''	''	''	Final Disposal to
12	83	6.95	4.6	2'10					6.1	''	GORDY	''	
3	80	7.05	4.6	2'10					6.0	''	''	''	Drying Bed No. 5
4	82	7.05	4.6	3"		JACOBS	9760	HH.	6.1	''	''	''	Drying Time –days
15	81	7.1	4.6	1'0					6.1	''	''	GEO.	Final Disposal to
16	80	7.0	4.6	1'0					6.1	''	''	''	
17	–	–	4.7	3'7					6.1	RAY	''	''	Lagon
18	85	7.1	4.6	6"					6.2	''	''	''	Final Disposal to
19	83	7.1	4.6	6"					6.1	''	ROGER	''	
20	84	6.95	4.6	3'4					5.8	''	''	''	
21	85	7.0	4.6	11"					5.9	''	''	ROSE	Hauled Out
22	87	7.0	4.6	2'3					6.0	''	''	BOB	To MON
23	86	6.9	4.7	1'0					5.8	''	''	CEC	COMPOSITE SAMP
24	85	6.9	4.7	2'5					6.1	GORDY	''	''	INF 8:00 A.M. →
25	–	–	4.6	3'7					6.3	''	''	''	EFF. 8:00 A.M. →
26	84	7.0	4.6	10"					6.0	''	RAY	GEO	FLOW = 4,758,00
27	83	7.1	4.6	10'					5.9	''	''	''	CLARIFIER TIME =
28	–	–	4.7	3'2					6.1	''	''	''	B. O. D. INF. 192.5
29	83	7.0	4.7	9"					6.1	''	''	CEC	SED. S. INF 7.5 M
0	83	7.05	4.6	9"					5.8	''	''	''	SUSP. S. INF NG
1	84	7.0	4.7	3'4					5.8	ROGER	''	''	P.H. INF. 7.6
Ave.	82.8	7.02	4.51						6.05				
Max.	87	7.1	4.7						6.3				
Min.	78	6.9	2.1						5.8				
Totals													

7-11-67	RAW SLUDGE	#1	#2	#3	#1
		BOTTOM			5' OF
% TOTAL SOLIDS	4.99	10.15	26.25	5.71	1.35
% FIXED	29.51	61.17	77.89	43.04	43.18
% VOLATILE	70.49	38.83	22.11	56.96	56.82

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

ay	Afternoon	Night
RAY	HARV.	BOB
''	''	''
RDY	''	''
''	''	''
''	RAY	NORM
''	''	''
''	''	BOB
''	''	RICH
''	''	BOB
GER	''	''
''	''	''
''	GORDY	''
''	''	''
''	''	''
''	''	GEO.
''	''	''
Y	''	''
''	''	''
''	ROGER	''
''	''	''
''	''	ROSE
''	''	BOB
''	''	CEC
RDY	''	''
''	''	''
''	RAY	GEO
''	''	''
''	''	''
''	''	CEC
''	''	''
GER	''	''

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

MONTHLY TEST (7-13-67)
COMPOSITE SAMPLES = HOURLY
INF. 8:00 A.M. → 4:00 P.M.
EFF. 8:00 A.M. → 8:00 A.M. (24 HR.)
FLOW = 4,758,000 G.P.D.
CLARIFIER TIME = 3 HR. 40. MIN.
B.O.D. INF. 192.5, EFF. 74.25 ~~ppm~~, RED. 61.39%
SED. S. INF. 7.5 ML/L, EFF. 0.2 ML/L, RED. 97.3 %
SUSP. S. INF. NG., EFF. NG.
P.H. INF. 7.6, EFF. 7.7

7-11-67	RAW SEWAGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	[illegible]
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			MAYANT
% TOTAL SOLIDS	4.98	10.15	26.25	5.71	1.35	.71	9.12	1.42	.67	.32	.21
% FIXED	29.51	61.17	22.89	43.64	43.18	41.77	42.97	42.65	42.32	45.99	49.17
% VOLATILE	70.49	38.83	77.11	56.96	56.82	58.23	57.03	57.35	57.68	54.01	50.83

B

REMARKS

7-10-67 HEAT EXCHANGER HARDNESS
PUT IN 20 OZ. BOILER CO

CITY GAS METER
22,400 CU. FT. GAS USED IN

NO. MANKATO SEWAGE
OUR METER = 18,947,400 GAL.
THEIR " = 18,396,800 "

CHLORINE
7-6-67 REC. 2 JONES CYL
7-16-67 LYON PICKED UP 6
21 JONES " " 2
25 HAWKINS " " 5

Operator in Charge

Ralph R.

sted
ped To

d No. 1
e—Days
sal to

d No. 2
ne—Days
sal to

d No. 3
ne—Days
sal to

d No. 4
ne—Days
sal to

d No. 5
ne—days
sal to

sal to

MONTHLY TEST (7-13-67)
ITE SAMPLES = HOURLY
8:00 A.M. → 4:00 P.M.
8:00 A.M. → 8:00 A.M. (24 HR.)
4,758,000 G.P.D.
ER TIME = 3 HR. 40. MIN.
INF. 192.5, EFF. 74.25 ppm, RED. 61.39%
INF 2.5 Mg/l, EFF. 0.2 Mg/l, RED. 92.3 %
INF NG., EFF. NG.
INF. 7.6, EFF 7.7

# 3	#1	#2	#3	#1	#2	#3	C...
om	5' OFF BOTTOM			10' OFF BOTTOM			NAVANT
5.71	1.35	.71	9.17	1.42	.67	.22	.21
43.64	43.18	41.77	42.97	42.65	42.32	45.99	49.17
56.96	56.42	58.23	37.63	57.35	57.68	54.01	50.83

B

REMARKS

7-10-67 HEAT EXCHANGER HARDNESS 7.0 G.P.G.
PUT IN 20 OZ. BOILER COMPOUND

CITY GAS METER
22,400 CU FT. GAS USED IN JULY

NO. MANKATO SEWAGE FLOW
OUR METER = 18,947,400 GAL.
THEIR " = 18,396,800 "

CHLORINE
7-6-67 REC. 2 JONES CYL
7-16-67 LYON PICKED UP 6 EMPTYS
21 JONES " " 2 "
25 HAWKINS " " 5 "

Operator in Charge

Ralph R. Rader

C

CITY OF MANKATO

SEWAGE TRE
MONTHLY OPE

GENERAL

	Day of Week River	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage Influent	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.		Ph Influent
		1	Cl	S-SE	85/55	67	3,450,000		14,640	3.9 s				.58		7.6
		2	C	CALM	83/56	67	3,294,000		17,080	4.3 s				.74		7.4
		3	C	W-NW	73/51	66	3,159,600		18,300	4.0 s				.45		7.3
		4	C	N-NW	76/50	67	3,198,000		17,040	2.7 s				.36		8.4
		5	C	W-NW	83/60	66	3,006,000		18,300	91 G / 2.3 s				.70		7.2
RAIN		6	Cl	S-SE	84/56	66	3,703,800		19,520	7.1 s				1.14		7.3
		7	Cl	S-SW	78/57	67	3,592,200		15,960	5.1 s				.62		7.5
	3.3	8	P Cl	S-E	83/57	66	3,474,600		10,980	2.7 s				.54		7.2
		9	P Cl	N-W	72/44	67	3,201,000		14,640	3.3 s				.65		7.4
	3.2	10	C	N-E	74/43	67	3,127,200		13,420	3.6 s				.69		7.5
		11	C	CALM	78/48	66	3,192,400		14,640	3.9 s				.60		7.3
	3.1	12	C	CALM	83/52	67	2,175,400		13,420	117 G / 2.7 s				.67		7.7
	3.1	13	P Cl	S-E	84/65	65	2,662,800		15,860	3.1 s				.86		7.1
	3.1	14	P Cl	S	83/61	67	3,367,200		17,080	4.0 s				.47		7.2
	3.0	15	C	S	88/66	67	3,325,200		12,200	3.1 s				.82		7.3
	3.0	16	C	S	88/66	66	3,360,000		13,420	4.1 s				.57		7.4
	2.9	17	Cl	CALM	87/57	67	3,344,720		14,640	3.3 s				.58		7.4
	2.9	18	Cl	NE	68/39	67	3,015,000		13,420	4.7 s				.43		7.1
	2.9	19	Cl	CALM	73/45	66	2,829,000		13,420	80 G / 3.1 s				.42		7.3
		20	C	N	85/55	66	2,565,600		10,980	3.6 s				.81		7.3
		21	Cl	N-NE	72/54	68	3,160,800		15,860	3.7 s				.56		7.4
AIN		22	Cl	S-SE	66/52	66	3,162,000		14,640	4.4 s				.77		7.4
		23	Cl	E-NE	73/60	65	3,644,400		18,300	4.1 s				.75		7.4
		24	C	S-SE	57/52	67	3,420,000		12,200	4.0 s				.84		7.3
AIN		25	C	S	83/53	66	3,916,400		13,420	97 G / 4.0 s				.64		7.5
		26	Cl	N-NW	66/38	65	3,228,000		21,960	2.3 s				.97		7.4
		27	C	W-NW	76/46	64	2,610,600		8,540	2.4 s				1.13		7.4
	3.4	28	C	S-E	81/50	66	3,568,400		14,640	4.7 s				.48		7.4
		29	P Cl	CALM	77/46	67	3,179,400		13,420	3.0 s				.54		7.4
		30	P Cl	CALM	67/39	66	3,032,400		13,420	2.5 s				.86		7.5
		31	C	E	76/46	65	2,941,400		14,640	2.5 s				.69		7.4
	Ave.				78.2/52.2	66.29	3,214,720		14,837	96.25 G / 3.65 s				.675		7.4
	Max.				88/66	68	3,916,800		21,960	117 G / 7.1 s				1.14		8.4
	Min.				66/38	64	2,175,400		8,540	40 G / 2.4 s				.36		7.1
			Totals				99,656,400		457,940	385 G / 113.2 s						

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH Ju

								DIGESTER NO. 1							DIGESTER NO.						
Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.		INFLUENT PH	Temp.	P.h.	Pressure	~~Cu ft Gas Produced~~ LEVEL	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed
,640	3.9 s				.58		7.6	95	6.95	4.9	9.0	14,640			95	7.0	4.8	3.4			
,080	4.3 s				.74		7.4	95	6.95	4.9	9.0	17,080			95	7.0	4.7	2.4			
,300	4.0 s				.45		7.3	95	7.0	4.9	9.0	18,300			95	7.0	4.8	1.2			51
,080	2.7 s				.36		8.4	95	7.0	4.9	9.0	17,080			94	7.0	4.7	3.5			
,300	91 G / 2.3 s				.70		7.2	95	7.0	4.9	9.0	18,300			94	7.0	4.8	2.3			
,520	7.1 s				1.14		7.3	95	7.0	4.9	9.0	19,520			94	7.0	4.8	1.0			50
,860	5.1 s				.62		7.5	95	7.1	4.4	9.0	15,860			95	7.2	4.6	3.1			
,980	2.7 s				.54		7.2	95	7.0	4.9	9.0	10,980			94	7.1	4.8	2.0			
,640	3.3 s				.65		7.4	95	7.0	4.7	9.0	14,640			94	7.1	4.6	1.3			48
,420	3.6 s				.69		7.5	95	7.0	4.4	9.0	13,420			94	7.15	4.7	3.7			
,640	3.9 s				.60		7.3	95	7.0	4.8	9.0	14,640			94	7.05	4.7	2.8			
,420	117 G / 2.7 s				.67		7.7	95	7.0	4.8	9.0	13,420			94	7.1	4.7	1.8			39
,860	3.1 s				.86		7.1	95	7.0	4.8	9.0	15,860			94	7.05	4.6	3.5			
,080	4.0 s				.47		7.2	95	6.9	4.5	9.0	17,080			95	7.0	4.4	2.4			
,200	3.1 s				.82		7.3	95	6.9	4.8	9.0	12,200			94	7.0	4.6	1.2			43
,420	4.1 s				.57		7.4	95	6.9	4.5	9.0	13,420			95	7.0	4.4	3.4			
,640	3.3 s				.58		7.4	95	7.0	4.5	9.0	14,640			94	7.0	4.5	2.5			
,420	4.7 s				.73		7.1	95	7.0	4.4	9.0	13,420			94	7.0	4.3	1.5			36
,420	60 G / 3.1 s				.42		7.3	96	7.0	5.0	9.0	13,420			95	7.0	4.9	3.0			
,980	3.6 s				.81		7.3	95	7.0	4.9	9.0	10,980			95	7.0	4.8	2.1			29
,860	3.7 s				.56		7.4	95	6.8	4.4	9.0	15,860			94	6.9	4.3	3.4			
,640	4.4 s				.77		7.4	95	6.95	4.9	8.0	14,640			95	7.6	4.8	2.3			29
,300	4.1 s				.75		7.4	95	6.95	4.9	8.0	18,300			94	6.45	4.8	3.3			
,200	4.0 s				.84		7.3	95	6.9	4.7	7.0	12,200			95	6.9	4.6	2.0			
,420	97 G / 2.0 s				.64		7.5	95	6.95	4.5	7.0	13,420			95	7.0	4.4	1.2			3
,960	2.3 s				.97		7.4	95	7.0	4.8	7.0	21,960			95	7.0	4.8	2.11			
,540	2.4 s				1.13		7.4	95	7.0	4.8	7.0	8,540			95	7.0	4.7	1.5			4
,640	4.7 s				.78		7.4	95	7.0	4.8	7.0	14,640			94	7.1	4.6	3.7			
,420	3.0 s				.54		7.4	95	7.0	5.0	7.0	13,420			94	7.1	4.8	2.7			
,420	2.5 s				.86		7.5	95	7.0	4.9	7.0	13,420			94	7.1	4.7	1.8			3
,640	2.5 s				.69		7.4	95	7.0	4.9	6.0	14,640			94	7.1	4.7	3.1			
,837	96.25 G / 3.65 s				.675		7.4	95	6.98	4.78	8.34	14,837			94.4	7.03	4.66				46
,960	117 G / 7.1 s				1.14		8.4	96	7.1	5.0	9.0	21,960			95	7.2	4.9				51
,540	40 G / 2.4 s				.36		7.1	95	6.8	4.4	6.0	8,540			94	6.4	4.3				2
,940	385 G / 113.2 s											452,940									4

D

MENT PLANT
TION REPORT

MONTH August 1967

DIGESTER NO. 1					DIGESTER NO. 2								
Pressure	~~Cu Ft Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		No Mankato Sewage Flow G.P.D.
4.9	9.0	14,640			95	7.0	4.8	3.4					492,900
4.9	9.0	17,080			95	7.0	4.7	2.4					473,100
4.9	9.0	18,300			95	7.0	4.8	1.2			51,240		481,700
4.9	9.0	17,080			94	7.0	4.7	3.5					483,700
4.9	9.0	18,300			94	7.0	4.8	2.3					479,300
4.9	9.0	19,520			94	7.0	4.8	1.0			50,020		513,000
4.4	9.0	15,860			95	7.2	4.6	3.1					528,400
4.9	9.0	16,980			94	7.1	4.8	2.0					508,600
4.7	9.0	14,640			94	7.1	4.6	1.3			48,800		482,400
4.4	9.0	13,420			94	7.15	4.7	3.7					474,600
4.8	9.0	14,640			94	7.05	4.7	2.8					483,800
4.8	9.0	13,420			94	7.1	4.7	1.8			39,040		466,400
4.8	9.0	15,860			94	7.05	4.6	3.5					461,900
4.5	9.0	17,080			95	7.0	4.4	3.4					520,300
4.8	9.0	12,200			94	7.0	4.6	1.2			43,920		513,600
4.5	9.0	13,420			95	7.0	4.4	3.4					499,500
4.5	9.0	14,640			94	7.0	4.5	2.5					485,600
4.4	9.0	13,420			94	7.0	4.3	1.5			36,600		452,500
5.0	9.0	13,420			95	7.0	4.9	3.0					448,400
4.9	9.0	16,980			95	7.0	4.8	2.1			29,280		381,000
4.4	9.0	15,860			94	6.9	4.3	3.4					479,800
4.9	8.0	14,640			95	7.0	4.8	2.3			29,280		365,200
4.9	8.0	18,300			94	6.45	4.8	3.3					466,600
4.7	7.0	12,200			95	6.9	4.6	2.0					501,200
4.5	7.0	13,420			95	7.0	4.4	1.2			39,040		535,200
4.8	7.0	21,960			95	7.0	4.8	2.1					460,800
4.8	7.0	8,540			95	7.0	4.7	1.5			40,260		388,800
4.8	7.0	14,640			94	7.1	4.6	3.7					494,800
5.0	7.0	13,420			94	7.1	4.8	2.7					463,400
4.9	7.0	13,420			94	7.1	4.7	1.8			34,160		442,800
4.9	[illegible]	14,640			94	7.1	4.7	3.1					444,800
4.75	8.39	14,837			94.4	7.03	4.66				40,149		471,580
5.0	9.0	21,960			95	7.2	4.9				51,240		535,200
4.4	6.0	8,540			94	6.4	4.3				29,280		365,200
		452,940									441,640		14,618,100

Date	DIGESTER NO. 3									SHIFT OPERATORS			
	Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To	Raw Sludge Average PH		Int. for Reg. Time and add overtime if any Day	Afternoon	Night	Cu. Ft. Digested Sludge Pumped To This Month Drying Bed No. 1 Drying Time—Day Final Disposal to
1	85	7.0	4.7	10"				5.9		Roger	Ray	Cec	Drying Bed No. 2
2	84	7.0	4.7	2'7				6.0		"	Gordon	"	Drying Time - Day
3	-	-	4.7	4'0				5.9		"	"	"	Final Disposal to
4	85	7.1	4.6	6"				6.1		"	"	Rose	
5	83	7.1	4.7	6"				6.1		"	"	Geo	Drying Bed No. 3
6	84	7.05	4.7	3'6				6.1		"	"	Cec	Drying Time—Day
7	84	7.0	4.5	1'1				6.2		Ray	"	Harv.	Final Disposal to
8	85	6.95	4.7	1'2				6.2		"	"	Cec	
9	—	-	4.5	3'3				6.3		"	Roger	"	Drying Bed No. 4
10	84	7.1	4.6	5"				6.0		"	"	"	Drying Time—Day
11	84	6.95	4.5	1'11				6.1		"	"	"	Final Disposal to
12	83	7.0	4.6	2'11				6.0		"	"	Norm	
13	85	7.0	4.5	9"				5.8		"	"	"	Drying Bed No. 5
14	83	7.0	4.3	2'0				6.0		Gordon	"	"	Drying Time—days
15	83	7.0	4.3	3'6				6.0		"	"	"	Final Disposal to
16	85	7.0	4.3	5"				-		Harvey	Ray	"	
17	84	7.0	4.4	1'7				5.7		Gordon	"	"	Lagon
18	-		4.2	3'0				5.9		"	"	Rose	Final Disposal to
19	82	7.1	4.8	10"				6.0		"	"	Cec	
20	83	6.9	4.8	2'2				5.9		"	"	Norm	
21	84	6.9	4.2	9"				5.8		Roger	"	"	Hauled Out
22	83	7.1	4.7	2'3				5.9		"	"	"	To
23	83	7.0	4.7	9"				5.9		"	Gordon	"	Mon
24	84	7.0	4.6	7"				5.9		"	"	"	Composite
25	83	7.0	4.3	2'9				5.8		"	"	"	Inf. 8
26	83	7.05	4.1	10"				5.9		"	"	Bob	Eff. 8
27	81	7.1	4.6	2'3				6.1		"	"	"	Flow = 3,6
28	84	7.0	4.8	8"				6.0		Ray	"	"	Clarifier T
29	84	7.0	4.6	6"				6.1		"	"	"	B.O.D. = Inf.
30	82	7.05	4.6	2'4				6.0		"	Roger	"	Sed S. = Inf.
31	83	7.0	4.6	5"				6.2		"	"	"	Susp. S. = Inf.
.e.	83.6	7.02	4.56					5.99					PH = Inf.
Max.	86	7.1	4.8					6.3					
Min.	81	6.9	4.2					5.7					
Totals													

8-22-67	Raw Sludge	#1	#2	#3
		Bottom		
% Total Solids	3.93	26.33	28.99	9.97
% Fixed	19.75	72.86	76.26	44.34
% Volatile	80.25	27.14	23.74	55.66

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

Day	Afternoon	Night
Roger	Ray	Cec
"	Gordon	"
"	"	"
"	"	Rose
"	"	Geo
"	"	Cec
Ray	"	Harv.
"	"	Cec
"	Roger	"
"	"	"
"	"	"
"	"	Norm
"	"	"
Gordon	"	"
"	"	"
Harvey	Ray	"
Gordon	"	"
"	"	Rose
"	"	Cec
"	"	Norm
Roger	"	"
"	"	"
"	Gordon	"
"	"	"
"	"	"
"	"	Bob
"	"	"
Ray	"	"
"	"	"
"	Roger	"
"	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

MONTHLY TEST (8-23-67)
COMPOSITE SAMPLES (HOURLY)
INF. 8:00 A.M. → 4:00 P.M.
EFF. 8:00 A.M. → 8:00 A.M.
FLOW = 3,644,400 G.P.D.
CLARIFIER TIME ~~#~~ 4 HOUR 47 MIN.
B.O.D. = INF. 135 ppm, EFF. 102.5 ppm, RED. 24.1 %
SED S. = INF. 6.5 ML/L, EFF. 0.75 ML/L, RED. 88.46 %
SUSP. S. = INF. .0298 GR., EFF. .0.165 GR., RED. 44.6 %
PH = INF. 7.6, EFF. 7.5

REMARKS

8-3-67 – TOUR – M.S. COLLAG
8-6-67 TROUBLE WITH LIMITT
BY-PASS 7:30 → 8:00
PARTIAL BY-PASS 8:00 → 9
REASON – 2" OF RAI
8-14-67 ALL WEEK – NALCO USI
8-29-67 " " "

CITY GAS ME
23,600 CU. FT. USED IN A

NO MANKATO SEW
OUR METER = 14,619,100 G.P.M., TRE

CHLORINE
8-4-67 RECEIVED 5 CYL.
RETURNED 2 EM

8-22-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPER-NATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	3.93	28.33	28.99	9.97	1.35	.77	8.94	1.42	.69	.24	.24
% FIXED	19.75	77.86	76.26	44.34	43.69	44.87	44.92	42.57	42.24	43.86	42.82
% VOLATILE	80.25	22.14	23.74	55.66	56.31	55.13	55.08	57.43	57.26	56.14	57.18

B

Operator in Charge
Ralph R.

Digested
umped To
nth

Bed No. 1
Time—Days
isposal to

Bed No. 2
Time—Days
isposal to

Bed No. 3
Time—Days
isposal to

Bed No. 4
Time—Days
isposal to

Bed No. 5
Time—days
isposal to

isposal to

Out

Monthly Test (8-23-67)
osite Samples (Hourly)
Inf. 8:00 A.M. → 4:00 P.M.
Eff. 8:00 A.M. → 8:00 A.M.
= 3,644,400 G.P.D.
eter Time ~~#~~ 4 Hour 47 Min.
= Inf. 135 ppm, Eff. 102.5 ppm, Red. 24.1 %
= Inf. 6.5 ml/l, Eff. 0.75 ml/l, Red. 88.46 %
= Inf. .0298 Gr., Eff. .0.165 Gr., Red. 44.6 %
= Inf. 7.6, Eff. 7.5

	#3	#1	#2	#3	#1	#2	#3	Super.
om		5' Off Bottom			10' Off Bottom			[illegible]
99	9.97	1.35	.79	8.94	1.42	.69	.24	.24
26	44.34	43.69	44.87	44.92	42.57	42.24	43.86	42.82
[illegible]	51.66	56.31	55.13	55.08	57.43	57.26	56.14	57.18

P

REMARKS

8-3-67 – Tour – M.S. Collage
8-6-67 Trouble With Limitturque – OK Now
By-Pass 7:30 → 8:00 A.M. = ½ Hour
Partial By-Pass 8:00 → 9:30 A.M. 1½ "
Reason – 2" Of Rain
8-14-67 All Week – Nalco Using 675 In Plant
8-29-67 " " " " " " "

City Gas Meter
23,600 Cu. Ft. Used In August

No Mankato Sewage Flow
Our Meter = 14,619,100 G.P.M., Their Meter = 14,004,900 G.P.M.

Chlorine
8-4-67 Received 5 Cyl. From Jones
Returned 2 Emptys

Operator in Charge
Ralph R. Rader

C

SEWAGE TR
MONTHLY O

CITY OF MANKATO

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max. / Min.	Temp. of Sewage	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.		INFLUENT PH
	1	C	S	72/41	66°	2,992,200		15,860					.2		7.6
	2	C	S	73/42	67	2,776,800		13,420	108 G				.88		7.8
	3	C	SE	73/46	66	2,493,800		13,420	10.7 S				1.18		7.6
	4	C	SE	76/48	64	2,691,000		14,640					1.25		7.4
	5	C	CALM	78/45	64	2,960,400		17,080					.34		7.5
	6	C	"	81/48	65	2,962,800		14,640	9.4 S				.42		7.4
	7	C	"	83/56	66	3,033,000		12,200					.48		7.3
	8	P.CL	"	81/64	66	2,958,000		13,420					.23		7.4
	9	C	"	75/48	65	2,797,200		15,860	81 G				.46		7.3
	10	P.CL	SE	76/47	66	2,520,600		10,980	16 S				.93		7.4
	11	C	E-SE	77/59	65	3,026,400		14,640					.58		7.3
	12	CL	E-SE	75/57	65	2,899,200		15,860	8 S				.56		7.5
	13	CL	S-SE	66/54	66	2,976,000		14,640					.53		7.5
	14	C	W-NW	72/48	65	2,918,400		17,080					.64		7.5
	15	C	CALM	77/47	65	3,072,000		13,420	8.0 S				.68		7.5
	16	CL	S SE	81/50	65	2,946,000		17,080	92G/3.3 S				.67		7.8
	17	P.CL	S	79/52	66	2,406,600		17,080					1.28		7.5
	18	P.CL	CALM	80/53	66	3,201,000		13,420					.44		7.4
	19	CL	E	82/55	67	3,225,600		14,600	12 S				.70		7.4
	20	CL	SW	77/45	67	3,168,600		17,080					.52		7.4
	21	C	N	64/38	67	3,060,600		15,860					.43		7.8
	22	C	NE	71/38	67	3,081,000		24,400	12.7 S				.41		7.7
	23	P.CL	CALM	64/33	66	2,872,200		14,640	121 G				.52		7.5
	24	C	"	72/47	67	2,603,400		9,760					.34		7.7
	25	C	S	85/50	67	3,252,600		18,300	3.4 S				.76		7.6
	26	CL	NW	51/36	66	2,943,000		18,300					.77		7.7
	27	P.CL	N	51/28	65	2,968,200		10,980					.44		7.7
	28	C	NE	56/26	65	2,921,200		20,740	12 S				.45		7.6
	29	C	CALM	67/37	66	3,021,000		15,860					.64		7.5
	30	C	S	80/51	66	2,881,800		14,640	108 G				.52		7.7
	31														
RIVER															
Ave.					65.8	2,921,820		15,330	102G/3.5 S				.61		7.5
Max. 3'					67	3,252,600		24,400	121G/16 S				1.28		7.8
Min. 2'6					64	2,406,600		9,760	81G/3.3 S				.20		7.3
		Totals				87,654,600		459,900	510G/105.5 S						

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH Sept.

		B.O.D.					DIGESTER NO. 1							DIGESTER NO. 2						
Screenings Cu. Ft.	Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF.		Influent pH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Sludge Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To 3
				.2		7.6	95	7.0	4.8	5.0	15,860			94	7.1	4.6	2'1			29,280
98 G				.88		7.8	95	7.0	4.7	5.0	13,420			94	7.15	4.7	3'0			
.7 s				1.18		7.6	95	7.05	4.8	5.6	13,420			94	7.1	4.8	2'1			29,280
				1.25		7.4	95	7.0	4.7	5.0	14,640			95	7.1	4.5	3'2			
				.34		7.5	95	7.0	4.7	5.0	17,080			94	7.1	4.5	2'2			29,280
7.4 s				.42		7.4	95	7.0	4.8	6.0	14,640			94	7.1	4.6	3'0			
				.48		7.3	95	7.1	4.8	5.5	12,200			94	7.0	4.6	2'0			31,720
				.23		7.4	95	7.0	4.8	6.0	13,420			94	7.0	4.6	3'4			
1 G				.46		7.3	95	7.1	4.7	6.0	15,860			94	7.1	4.5	2'5			
16 s				.93		7.4	95	7.0	4.8	5.5	10,980			94	7.0	4.6	1'4			36,600
				.58		7.3	95	6.85	4.75	5.0	14,640			94	6.85	4.6	3'1			
8 s				.56		7.5	94	6.8	4.45	5.0	15,860			94	6.9	4.25	2'1			
				.53		7.5	95	6.9	4.5	5.0	14,640			94	6.95	4.3	1'0			36,600
				.64		7.5	95	6.95	4.5	5.0	17,080			94	7.0	4.3	2'6			
8.0 s				.68		7.5	95	6.9	5.0	5.0	13,420			94	6.95	4.8	1'4			32,940
3G / 3.3 s				.67		7.8	95	6.9	4.9	5.0	17,080			94	6.9	5.0	2'8			
				1.28		7.5	95	6.9	4.9	5.0	17,080			94	6.9	5.1	1'6			40,260
				.44		7.4	95	6.9	4.8	5.0	13,420			94	7.0	5.0	3'1			
2 s				.70		7.4	95	6.9	4.9	5.0	14,640			94	7.0	4.7	2'2			
				.52		7.4	94	6.85	4.6	5.0	17,080			94	7.0	4.4	1'2			46,360
				.43		7.8	95	7.0	4.9	5.0	15,860			94	7.05	4.7	3'2			
2.7 s				.41		7.7	95	7.0	4.9	5.0	24,400			94	7.15	4.7	2'1			34,160
21 G				.52		7.5	95	7.0	4.2	5.0	14,640			94	7.1	5.0	2'4			
				.34		7.7	95	7.0	4.9	5.0	9,760			94	7.05	4.7	1'9			21,960
3.4 s				.74		7.6	95	7.0	4.8	6.5	18,300			94	7.0	4.5	2'7			
				.77		7.7	94	7.0	4.6	5.0	18,300			94	7.0	4.3	1'4			39,040
				.44		7.7	95	6.9	5.2	5.0	10,980			94	7.0	5.0	2'9			
2 s				.45		7.6	95	6.9	4.8	8.0	20,740			94	7.0	4.7	2'0			
				.64		7.5	95	7.0	4.5	5.0	15,860			94	7.0	4.3	2"			41,480
98 G				.52		7.7	95	6.9	4.8	5.0	14,640			94	7.0	4.7	2'4			
02G / 3.5 s				.61		7.53	94.9	6.96	4.75	5.24	15,330			94	7.02	4.64				34,535
16G / 10 s				1.28		7.8	95	7.1	5.2	8.0	24,400			95	7.15	5.1				46,360
6 / 3.3 s				.20		7.3	94	6.8	4.5	5.0	9,760			94	6.85	4.25				21,960
06G / 105.5 s											452,800									448,96

TREATMENT PLANT OPERATION REPORT

MONTH Sept. 1967

	DIGESTER NO. 1							DIGESTER NO. 2								
pH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Sludge Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To 3		No Mankato Sewage Flow G.P.D.
6	95	7.0	4.8	5.0	15,860			94	7.1	4.6	2'1			29,280		465,800
8	95	7.0	4.7	5.0	13,420			94	7.15	4.7	3'0					438,200
6	95	7.05	4.8	5.0	13,420			94	7.1	4.8	2'1			29,280		359,400
4	95	7.0	4.7	5.0	14,640			95	7.1	4.5	3'2					434,700
5	95	7.0	4.7	5.0	17,080			94	7.1	4.5	2'2			29,280		486,100
4	95	7.0	4.8	6.0	14,640			94	7.1	4.6	3'0					467,700
3	95	7.1	4.8	5.5	12,200			94	7.0	4.6	2'0			31,720		507,000
4	95	7.0	4.8	6.0	13,420			94	7.0	4.6	3'4					475,800
3	95	7.1	4.7	6.0	15,860			94	7.1	4.5	2'5					454,000
4	95	7.0	4.8	5.5	10,980			94	7.0	4.6	1'4			36,600		397,400
3	95	6.85	4.75	5.0	14,640			94	6.85	4.6	3'1					506,200
5	94	6.8	4.45	5.0	15,860			94	6.9	4.25	2'1					447,400
5	95	6.9	4.5	5.0	14,640			94	6.95	4.3	1'0			36,600		444,700
5	95	6.95	4.5	5.0	17,080			94	7.0	4.3	2'6					470,400
5	95	6.9	5.0	5.0	13,420			94	6.95	4.8	1'4			32,940		457,600
6	95	6.9	4.9	5.0	17,080			94	6.9	5.0	2'8					457,500
.5	95	6.9	4.9	5.0	17,080			94	6.9	5.1	1'6			40,260		397,800
.4	95	6.9	4.8	5.0	13,420			94	7.0	5.0	3'1					485,400
.4	95	6.9	4.9	5.0	14,640			94	7.0	4.7	2'2					453,500
4	94	6.85	4.6	5.0	17,080			94	7.0	4.4	1'2			46,360		453,800
.8	95	7.0	4.9	5.0	15,860			94	7.05	4.7	3'2					448,600
7	95	7.0	4.9	5.0	24,400			94	7.15	4.7	2'1			34,160		449,400
.5	95	7.0	4.2	5.0	14,640			94	7.1	5.0	2'4					431,800
.7	95	7.0	4.9	5.0	9,760			94	7.05	4.7	1'9			21,960		359,900
.6	95	7.0	4.8	6.5	18,300			94	7.0	4.5	2'7					477,300
7	94	7.0	4.6	5.0	18,300			94	7.0	4.3	1'4			39,040		423,700
7	95	6.9	5.2	5.0	10,980			94	7.0	5.0	2'9					424,500
6	95	6.9	4.8	8.0	20,740			94	7.0	4.7	2'0					422,600
5	95	7.0	4.5	5.0	15,460			94	7.0	4.3	2"			41,480		424,400
7	95	6.9	4.8	5.0	14,640			94	7.0	4.7	2'4					449,300
.53	94.9	6.96	4.75	5.28	15,330			94	7.02	4.64				34,535		446,010
.8	95	7.1	5.2	8.0	24,400			95	7.15	5.1				46,360		507,000
.3	94	6.8	4.5	5.0	9,760			94	6.85	4.25				21,960		359,400
					459,900									448,960		13,380,30

D

1

DIGESTER NO. 3

Date	Temp	PH	Pressure	Cover Ft	Cu. Ft. Gas Produced	~~Gal. Raw Sludge Added~~ [illegible]	Gals. Digested Sludge Removed	[illegible]	[illegible]
1	82	7.1	4.5	1'8					[illegible]
2	80	7.05	4.7	4'					6.[illegible]
3	82	7.1	4.7	1'4					6.[illegible]
4	82	7.1	4.5	3'					[illegible]
5	82	7.05	4.5	1'6					[illegible]
6	82	7.1	4.6	3'					[illegible]
7	81	7.1	4.5	1'10					5.[illegible]
8	82	7.[illegible]	4.6	6'					6.[illegible]
9	82	7.[illegible]	4.5	1'7					[illegible]
10	82	-	4.5	2'7					6.1
11	80	7.0	4.5	3'					6.0
12	81	6.95	4.15	1'0					6.1
13	-		4.25	2'2					6.1
14	82	7.1	4.2	3'		[illegible]	10,480	4#	6.2
15	81	7.6	4.7	1'1		"	17,640		6.[illegible]
16	83	7.6	4.4	3'					6.1
17	82	7.0	4.7	1'3					5.[illegible]
18	-		4.6	3'		"	13,420		6.0
19	-		4.6	1'3		"	19,520		[illegible]
20	-		4.3	3'		"	17,680		[illegible]
21	82	7.1	4.6	4''					6.2
22	81	7.0	4.4	2'1					6.[illegible]
23	82	7.0	3.8	4'					[illegible]
24	81	6.95	4.4	2'1					[illegible]
25			4.5	1'2					[illegible]
26	81	7.05	4.3	2'7					-
27	80	7.0	5.6	3					[illegible]
28	80	7.0	4.4	8					[illegible]
29	-		4.3	2'5					[illegible]
30	81	7.0	4.5	6'					[illegible]
31									
Ave.	87	7.04	4.5				15,616		
Max.	84	7.1	5.6				19,520		[illegible]
Min.	80	6.95	3.8				10,480		[illegible]
Totals							78,080		

SHIFT OPERATORS

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time Days
Final Disposal to

Drying Bed No. 2
Drying Time Days
Final Disposal to

Drying Bed No. 3
Drying Time Days
Final Disposal to

Drying Bed No. 4
Drying Time Days
Final Disposal to

Drying Bed No. 5
Drying Time days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

A

SHIP OPERATIONS

Cu. Ft. Digested
Sludge Pumped T
This Mon

Drying Bed No.
Drying Time Days
Final Disposal

Drying Bed No.
Drying Time Days
Final Disposal

Drying Bed No.
Drying Time Days
Final Disposal

Drying Bed No.
Drying Time Days
Final Disposal

Drying Bed No.
Drying Time Days
Final Disposal

Lagon
Final Disposal

Hauled Out

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Operator in Charge

B

REMARKS

Cu. Ft. Digested Sludge Pumped This Month

Drying Bed No.
Drying Time, Days
Final Disposal

Dr
Dr
Fina

Drying Bed No.
Drying Time, Days
Final Disposal

Drying Bed No.
Drying Time, Days
Final Disposal

Drying Bed No.
Drying Time, Days
Final Disposal

agon
inal Disposal

auled Off

[illegible]

Operater in Charge

Ralph R. Rader

CITY OF MANKATO

SEWAGE TREATM
MONTHLY OPERAT

GENERAL																	
Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max. / Min.	Temp. of Sewage Inf.	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Enf.	B.O.D. Ef.	Ch. Res. EF.		Influent pH	Temp.	P.
	1	C	SE	87/79	65	2,598,000		10,980					.93		7.6	95	6.9
	2	C	CALM	83/56	68	3,358,800		19,520	17.7 s				.33		7.6	95	6.8
	3	P.CL	E-SE	82/76	68	2,412,000		14,640					.35		7.8	95	6.95
	4	C	W-NW	74/36	67	3,198,000		20,740	5.3 s				.49		7.7	95	6.9
	5	C	CALM	62/35	65	2,880,000		20,740					.43		7.8	95	6.9
	6	C	E-NE	66/46	65	3,198,000		15,860					1.66		7.4	95	6.8
	7	CL	E-SE	57/41	64	2,976,000		14,640	12.0 s				.71		7.4	95	6.8
	8	CL	W-NW	42/35	63	2,528,400		15,860					1.41		7.5	95	6.8
	9	CL	NW	42/32	65	3,171,600		15,860					.69		7.5	95	6.8
	10	CL	SW	42/27	66	3,031,800		15,860					.47		7.4	95	6.9
	11	PCL	S	48/27	66	3,054,600		15,860	13.3 s				.29		7.6	95	7.0
	12	PCL	S	71/42	67	3,126,000		17,080					.30		7.5	95	7.0
	13	C	SW	69/37	67	3,076,800		17,670					.46		7.6	95	7.0
	14	PCL	NW	63/38	67	2,790,000		13,420	202 c/7.0 s				.68		7.4	95	7.0
	15	CL	E	60/36	66	2,602,200		20,740	17.0 s				.54		7.7	95	6.9
	16	PCL	CALM	64/39	67	3,055,800		18,300					.57		7.6	95	7.0
	17	C	NW	66/38	66	3,067,200		19,520					.72		7.5	95	7.0
	18	C	NW	54/25	66	3,042,000		9,760	13.3 s				.61		7.7	95	6.9
	19	C	NE	59/41	66	3,052,600		19,520					.45		7.7	95	7.0
	20	C	NW	56/23	65	3,072,200		18,300					.51		7.6	95	7.0
	21	C	W	66/48	66	2,805,600		9,760	108 c/8.2 s				.64		7.7	95	6.9
	22	C	SE	77/42	66	2,648,400		15,860	9.2 s				.82		7.7	95	6.9
	23	C	W-SW	77/38	66	3,171,600		15,860					.34		8.0	95	7.0
	24	CL	NW	49/34	67	3,675,600		17,080					.65		7.5	95	7.1
	25	CL	W-NW	36/22	65	3,038,400		18,300	14.7 s				.67		7.9	95	7.1
	26	CL	S-SW	34/28	65	3,606,000		20,740					.64		7.5	95	7.0
	27	CL	N-NW	33/18	64	3,672,000		13,420					.82		7.9	95	7.1
	28	C	CALM	42/33	63	3,808,000		19,520	117 c/13.2 s				.90		7.8	95	7.1
	29	CL	W-SW	38/14	64	3,724,000		14,640					.78		7.6	95	7.0
	30	P.CL	SW	47/23	66	4,030,000		15,860	10.6 s				.63		7.7	95	7.0
	31	C	SW	53/24	64	3,858,000		15,860					.57		7.7	95	7.0
River Ave.				57.6/34.4	65.6	3,082,030		16,411	11.25 s/142.6 c				.62		7.62	95	6.9
Max. 7.6				87/56	68	4,030,000		20,740	17.25 s/202 c				1.41		8.0	95	7.
Min. 7.5				33/14	63	2,412,000		9,760	5.35 s/[illegible] c				.29		7.4	95	6.
		Totals				95,543,000		508,746	134.95 s/427 c								

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH Oct

		B.O.D.					DIGESTER NO. 1							DIGESTER NO. 2						
Cu. Ft.	Scum Cu. Ft.	Inf.	Ef.	Ch. Res. EF.		Influent pH	Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To 3
				.93		7.6	95	6.9	4.6	5.0	16,950			94	7.0	4.5	1'4			30-500
5				.33		7.6	95	6.9	4.7	5.0	19,526			94	6.9	4.5	2'8			
				.35		7.5	95	6.85	4.8	5.0	14,640			94	6.85	4.6	1'4			30,500
5				.49		7.7	95	6.9	4.7	5.0	20,740			94	6.95	4.5	2'5			
				.43		7.8	95	6.95	5.2	5.0	20,740			94	6.95	5.0	1'0			48,800
				1.66		7.4	95	6.8	4.8	5.0	15,860			95	6.8	5.2	2'11			
5				.71		7.4	95	6.8	5.2	5.0	14,640			95	6.8	4.9	1'6			
				1.41		7.5	95	6.8	4.7	5.0	15,860			95	6.8	4.5	10"			48,800
				.64		7.5	95	6.85	5.0	5.0	15,860			94	6.95	4.8	3'1			
				.47		7.4	95	6.9	4.6	5.0	15,860			94	7.05	4.5	2'6			
5				.29		7.6	95	7.0	4.8	5.0	15,860			94	7.0	4.7	10"			34,160
				.36		7.5	95	7.0	5.0	5.0	17,080			94	7.05	4.9	2'2			
				.46		7.6	95	7.0	4.6	5.0	14,640			94	7.1	4.4	1'0			39,640
5				.68		7.4	95	7.0	4.6	5.0	13,420			94	7.05	4.3	2'8			
5				.54		7.7	95	6.95	4.6	5.0	20,740			94	7.1	4.5	1'9			46,360
				.57		7.6	95	7.0	5.0	5.0	18,300			94	6.9	4.8	3'6			
				.72		7.5	95	7.0	4.9	5.0	19,520			95	7.0	4.7	2'3			39,640
5				.61		7.7	95	6.9	5.0	5.0	9,760			94	7.0	4.9	3'7			
				.45		7.7	95	7.0	4.5	5.0	19,520			94	7.0	4.3	2'11			
				.51		7.6	95	7.0	4.5	6.0	18,300			94	7.0	4.4	1'7			43,920
5				.64		7.7	95	6.9	4.6	5.0	9,760			94	7.0	4.5	3'4			
5				.82		7.7	95	6.9	5.3	5.0	15,860			94	7.0	5.1	1'8			
				.34		8.0	95	7.0	4.5	5.0	15,860			94	7.1	4.4	1'7			35,380
				.65		7.5	95	7.1	4.4	5.0	17,080			94	7.2	4.3	2'11			
5				.67		7.9	95	7.1	5.0	4.0	18,300			94	7.2	4.8	1'9			46,360
				.64		7.5	95	7.0	4.7	5.0	20,740			94	7.1	4.5	3'8			
				.82		7.9	95	7.1	5.2	5.0	13,420			95	7.2	5.0	2'3			
5				.90		7.8	95	7.1	4.5	5.0	19,520			95	7.2	4.4	1'4			34,160
				.78		7.6	95	7.0	4.6	5.0	14,640			95	7.0	4.4	2'4			
5				.63		7.7	95	7.0	4.8	5.0	15,860			94	7.0	4.7	1'4			53,680
				.57		7.7	95	7.0	4.5	5.0	15,860			94	7.05	4.4	3'11			
6				.62		7.62	95	6.96	4.77	5.0	16,411			94.2	7.01	4.63				46,823
6				1.71		8.0	95	7.1	5.3	6.0	20,740			95	7.2	5.2				53,680
6				.29		7.4	95	6.8	4.4	4.0	9,760			94	6.8	4.3				30,500
6											508,740									530,200

B

EATMENT PLANT
PERATION REPORT

MONTH Oct 1967

DIGESTER NO. 1							DIGESTER NO. 2								
Temp.	P.h.	Pressure	~~Cu. Ft. Gas Produced~~	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		N. Mankato Sewage Flow GPD
95	6.9	4.6	5.0	10,990			94	7.0	4.5	1'4			30,500		378,600
95	6.9	4.7	5.0	19,520			94	6.9	4.5	2'8					481,900
95	6.95	4.8	5.0	14,640			94	6.85	4.6	1'4			30,500		442,800
95	6.9	4.7	5.0	20,740			94	6.95	4.5	2'5					437,200
95	6.95	5.2	5.0	20,740			94	6.95	5.0	1'0			48,800		432,600
95	6.8	4.8	5.0	15,860			95	6.8	5.2	2'11					445,300
95	6.8	5.2	5.0	14,640			95	6.8	4.9	1'6					453,900
95	6.8	4.7	5.0	15,860			95	6.8	4.5	10"			48,800		396,600
95	6.85	5.0	5.0	15,860			94	6.95	4.8	3'1					469,600
95	6.9	4.6	5.0	15,860			94	7.05	4.5	2'6					441,600
95	7.0	4.5	5.0	15,860			94	7.0	4.7	8"			34,160		425,200
95	7.0	5.0	5.0	17,080			94	7.05	4.4	2'2					431,200
95	7.0	4.6	5.0	14,640			94	7.1	4.4	1'0			39,640		438,600
95	7.0	4.6	5.0	13,420			94	7.05	4.3	2'8					422,800
95	6.95	4.6	5.0	20,740			94	7.1	4.5	1'9			46,360		368,400
95	7.0	5.0	5.0	18,300			94	6.9	4.8	3'6					481,960
95	7.0	4.9	5.0	19,520			95	7.0	4.7	2'3			39,640		443,460
95	6.9	5.0	5.0	9,760			94	7.0	4.9	3'7					435,200
95	7.0	4.5	5.0	19,520			94	7.0	4.3	2'11					479,200
95	7.0	4.5	6.0	18,300			94	7.0	4.4	1'7			43,920		450,400
95	6.9	4.6	5.0	9,760			94	7.0	4.9	3'4					427,800
95	6.9	5.3	5.0	15,860			94	7.0	5.1	2'8					364,600
95	7.0	4.5	5.0	15,860			94	7.1	4.4	1'7			35,380		486,600
95	7.1	4.4	5.0	17,080			94	7.2	4.3	2'11					434,300
95	7.1	5.0	4.0	18,300			94	7.2	4.8	1'9			46,360		440,300
95	7.0	4.7	5.0	20,740			94	7.1	4.5	3'8					434,200
95	7.1	5.2	5.0	13,420			95	7.2	5.0	2'3					451,800
95	7.1	4.5	5.0	19,520			95	7.2	4.4	1'4			34,160		450,200
95	7.0	4.6	5.0	14,640			95	7.0	4.4	2'4					404,400
95	7.0	4.8	5.0	15,860			94	7.0	4.7	1'4			53,680		481,400
95	7.0	4.5	5.0	15,860			94	7.05	4.4	3'11					440,600
95	6.96	4.77	5.0	16,411			94.2	7.01	4.63				40,823		436,720
95	7.1	5.3	6.0	20,740			95	7.2	5.2				53,680		486,600
95	6.8	4.4	4.0	9,760			94	6.8	4.3				30,500		364,600
				508,740									530,700		13,538,400

Date	DIGESTER NO. 3 Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		PH Raw Sludge Average/Day	SHIFT OPERATORS Int. for Reg. Time and add overtime if any Day	Afternoon	Night	Cu. Ft. Digested Sludge Pumped To This Month Drying Bed No. 1 Drying Time—Days Final Disposal to
1	81	7.0	4.7	1'6					5.9	GORDON	RAY	CEC	Drying Bed No. 2
2	82	7.0	4.4	6"					5.8	ROGER	"	"	Drying Time—Days
3	-		4.5	1'9		BROOKS	12,200	HH	6.2	"	"	"	Final Disposal to
4	83	7.05	4.2	5"		"	8,540	"	6.0	"	GORDY	"	
5	81	7.05	4.9	1'9		"	13,420	"	6.0	"	"	"	Drying Bed No. 3
6	81	7.0	4.5	4"		"	7,320	"	6.0	"	"	"	Drying Time—Days
7	80	6.8	4.8	1'6					5.9	"	"	N.H.	Final Disposal to
8	-	-	4.5	2'8					6.2	"	"	"	
9	78	6.9	4.8	4"					5.8	RAY	HARV	"	Drying Bed No. 4
10	81	6.9	4.5	1'3					6.0	"	"	"	Drying Time—Days
11	-	-	4.7	2'6					6.3	"	ROGER	"	Final Disposal to
12	79	7.0	4.9	9"					6.2	"	"	"	
13	81	7.0	4.3	2'0					6.0	HARV	"	ROSE	Drying Bed No. 5
14	82	7.0	4.2	4"					5.8	RAY	HARV	CEC	Drying Time—days
15	81	7.0	4.5	1'6					5.5	"	"	NORM	Final Disposal to
16	82	7.0	4.9	4"					5.8	GORDON	"	"	
17	-	-	4.5	1'5		"	5,490	"	5.9	"	ROGER	"	Lagon
18	82	7.0	5.0	4"		"	9,760	"	5.9	"	RAY	"	Final Disposal to
19	82	7.0	5.5	1'1					5.8	"	"	"	
20	-	-	4.5	2'8					6.0	"	"	"	
21	83	7.0	4.6	6"					6.0	"	"	BOB	~~Hauled Out~~ Ma
22	82	7.0	4.9	6"					6.1	"	"	"	~~To~~ COMPOSITE
23	-	-	4.2	2'6					6.2	ROGER	"	"	INF. =
24	78	7.1	4.1	4"					6.2	RAY	ROGER	"	EFF =
25	77	7.2	4.8	11"					6.1	ROGER	GORDY	"	FLOW = 3,
26	-	-	4.5	2'9					6.2	"	"	"	CLARIFIER
27	-	-	0	3'6					6.1	"	"	ROSE	B.O.D.-INF.
28	-	-	-	3'4					6.1	"	"	NORM	SED. S.=INF.
29	77	7.0	-	10"					6.0	"	"	BOB	TURB = INF.
30	73	7.1	4.5	3'6		"	10,980	"	5.8	RAY	"	"	SUSP. S.-INF.
31	76	7.1	4.3	7"		"	14,670	"	6.0	"	"	"	PH-INF.
Ave.	80	7.01	4.55				10,294		60.0				
Max.	83	7.2	5.0				13,420		63				
Min.	73	6.8	0				5,490		58				
Totals							82,350						

10-24-67	RAW SLUDGE	#1	#2	#3
		BOTTOM		
% TOTAL SOLIDS	4.88	13.90	25.24	7
% FIXED	19.05	77.42	78.32	45
% VOLATILE	80.95	22.58	21.2	

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

Day	Afternoon	Night
Gordon	Ray	Cec
Roger	"	"
"	"	"
"	Gordy	"
"	"	"
"	"	"
"	"	N.H.
"	"	"
Ray	Harv	"
"	"	"
"	Roger	"
"	"	"
Harv	"	Rose
Ray	Harv	Cec
"	"	Norm
Gordon	"	"
"	Roger	"
"	Ray	"
"	"	"
"	"	"
"	"	Bob
"	"	"
Roger	"	"
Ray	Roger	"
Roger	Gordy	"
"	"	"
"	"	Rose
"	"	Norm
"	"	Bob
Ray	"	"
"	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time Days
Final Disposal to

Drying Bed No. 2
Drying Time Days
Final Disposal to

Drying Bed No. 3
Drying Time Days
Final Disposal to

Drying Bed No. 4
Drying Time Days
Final Disposal to

Drying Bed No. 5
Drying Time days
Final Disposal to

Lagon
Final Disposal to

Hauled Out Monthly Test (10-31-67)
~~To~~ Composite Samples
Inf. – 8:00 A.M. – 4:00 P.M.
Eff. = 8:00 A.M. – 8:00 A.M.
Flow = 3,857,000 G.P.D.
Clarifier Time = 7 Hrs 32 Min.
B.O.D. – Inf. 252.5, Eff. 92.5, Red. 61.39%
Sed. S. – Inf. 9.0 ml/l, Eff. .15 ml/l, Red.
Turb. = Inf. 55, Eff. 5.6
Sus. S. – Inf. .01366 gr, Eff. .01066 gr, Red. 18.47%
pH – Inf. 7.6 Eff. 7.5

10-24-67	Raw Sludge	#1 Bottom	#2 Bottom	#3 Bottom	#1 5' Off Bottom	#2 5' Off Bottom	#3 5' Off Bottom	#1 10' Off Bottom	#2 10' Off Bottom	#3 10' Off Bottom	Super Natant
% Total Solids	4.88	13.90	25.24	7.10	1.93	.84	5.26	1.47	.83	.25	.24
% Fixed	19.05	77.42	78.72	45.55	37.63	38.12	45.42	36.27	39.40	48.03	50.76
% Volatile	80.95	22.58	21.28	54.45	62.37	61.88	54.58	63.73	60.60	51.97	49.24

REMARKS

Oct. 25,26,27 Swartout Hauled G
26,27 "Mike" Installed New
Unit (Bristol) + Power
26 Kato Elec Installed
26,27 Pulled #3 Digester S
St. Dept. Steamer
23,24,25 Hennesey Roofing – Se
Digester Covers
26 Park Dept. Hauled
Sludge To Park

City Gas
129,300 Cu. Ft. Used In

No. Mankato Sew
Our Meter = 13,538,400 G
Their " = 12,039,500

Boiler
pH = 8.6, Hardness = 16

Chlorine
Oct. 10 = Rec. 5 Cyl. From J

Operator in Charge
Ralph R

1
ays

2
ays
o

3
ays
o

4
Days
o

5
ays
o

o

Monthly Test (10-31-67)
…e Samples
= 8:00 A.M – 4:00 P.M
= 8:00 A.M – 8:00 A.M
…,858,000 G.P.D.
… Time = 7 Hrs 32 Min.
…f. 252.5, Eff. 97.5, Red. 61.39%
…f. 9.0 ml/l, Eff. .05 ml/l, Red
…f. 55, Eff. 5.6
…f. [illegible], Eff. [illegible], Red. 18.47%
…f. 7.6 Eff. 7.5

#3	#1	#2	#3	#1	#2	#3	Super
	5' Off Bottom			10' Off Bottom			Natant
7.10	1.03	.84	8.26	1.47	.83	.28	.24
45.55	37.63	34.12	45.42	36.27	34.40	48.03	50.76
59.45	62.37	61.58	54.58	63.93	60.60	51.97	44.24

REMARKS

Oct. 25,26,27 Subrick Hauled Gravel For Tunnel
26,27 "Mike" Installed New Type Receiver Drive Unit (Bristol) + Power Pack
26 Katz Elec. Installed Power Pack For Simplex
26,27 Pulled #3 Digester Screen, Cleaned With St. Dept Steamer
23,24,25 Hennessey Roofing – Sealed Tunnel + #2 + #3 Digester Covers
26 Park Dept. Hauled 5.5 Loads Of Dry Sludge To Park

City Gas
129,300 Cu. Ft. Used In October

No. Mankato Sewage Flow
Our Meter = 13,538,400 Gal. Diff=11.07%
Their " = 12,039,560 "

Boiler 10-2-67
pH = 8.6, Hardness = 1 Gr./Gal.

Chlorine
Oct. 10 = Rec. 5 Cyl. From Jones, Returned 3 Empty's

Operator in Charge
Ralph R. Rader

CITY OF MANKATO

SEWAGE T
MONTHLY O

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage INFLUENT	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.		INFLUENT
	1	P CL	SW	53/31	66°	3,884,000		15,860					.68		7.5
	2	CL	NW	43/21	66	3,852,000		19,520	12.0 S				.57		7.5
	3	P.CL	NW	30/21	66	3,844,000		15,860					.76		7.7
	4	CL	NW	36/19	67	3,666,000		17,640	121 G				.84		7.4
	5	CL	NW	34/17	66	3,243,000		14,640					.71		7.6
	6	C	NW	37/14	66	4,100,000		14,300					.41		7.6
	7	C	N	40/28	66	3,773,000		15,860					.88		7.7
	8	C	S	57/28	66	3,900,000		15,860	10.6 S				.17		7.5
	9	C	Calm	53/43	66	3,841,000		14,640					.65		7.5
	10	CL	S	59/31	66	3,773,000		15,860					.39		7.6
	11	C	S	61/33	65	3,540,000		14,640	108 G/13.45 S				.71		7.5
	12	CL	NW	39/25	65	3,123,000		13,420					.73		7.6
Snow	13	CL	W-NW	35/31	63	3,890,000		14,640					.59		7.8
	14	CL	N-NW	41/14	65	3,790,000		15,860					.62		7.4
	15	C	S-SW	43/34	64	3,780,000		18,300	17.2 S				1.18		7.5
	16	C	S SE	45/30	63	3,780,000		15,860					1.34		7.6
	17	CL	N-NW	51/35	64	3,810,000		19,520					102		7.9
	18	CL	N-NW	41/14	65	3,450,000		13,420	113 G/15.4 S				.89		7.2
	19	C	Calm	30/14	62	2,972,000		17,080					1.6		7.6
	20	CL	SE	43/21	64	4,114,000		15,860					.79		7.6
	21	PCL	SW	41/20	67	3,910,000		21,960	14.7 S				.73		7.4
	22	CL	NW	35/16	67	3,737,000		17,080					.73		7.
	23	CL	SE	41/22	66	3,038,000		13,420					1.54		7.5
	24	CL	S	36/25	65	3,422,000		17,080	[illegible] S				1.15		7.6
Snow	25	CL	Calm	40/18	66	3,200,000		16,980	129 G				.89		7.
	26	PCL	NW	25/11	66	3,014,000		13,420					1.25		7.6
	27	C	NW	22/5	63	3,940,000		15,860					.56		7.
	28	C	NW	18/15	62	3,731,000		18,300	13.0 S				.97		7.
	29	CL	SE	25/24	63	3,707,000		14,640					.91		7.
	30	CL	SE	34/30	63	3,750,000		12,200					.76		7.
	31														
Ave.				39.35/17.0	65	3,651,200		15,966	118 G/13.0 S				.82		7.5
Max.				65/43	67	4,114,000		21,960	129 G/17.0 S				1.54		7.
Min.				18/5	62	2,972,000		12,200	105 G/10.0 S				.27		7.
		Totals				109,535,000		479,020	471 G/104 S						

A

SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH

ERAL													DIGESTER NO. 1					DIGE				
				B.O.D.																		
Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Inf.	Ef.	Ch. Res. Ef.		Influent pH	Temp.	P.h.	Pressure	~~Cu-ft Gas~~ Produced Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To			Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw
	15,860					.68		7.5	95	7.0	4.5	5.0	15,860				94	7.1	4.4	2'10		
	19,520	12.0 s				.57		7.5	95	6.9	4.6	5.0	19,520				94	7.1	4.4	1'9		
	15,860					.70		7.7	95	7.0	5.1	5.0	15,860				94	7.1	4.9	3'7		
	17,080	121 G				.84		7.4	95	7.0	5.3	5.0	17,080				94	7.1	5.2	2'6		
	14,640					.71		7.6	95	7.0	4.9	5.0	14,640				94	7.05	4.7	1'4		
	18,300					.41		7.6	95	6.9	4.7	5.0	18,300				92	7.0	4.3	3'6		
	15,860					.88		7.7	95	6.9	4.8	5.0	15,860				93	7.0	4.5	2'3		
	15,860	10.6 s				.77		7.5	95	6.9	5.0	5.0	15,860				93	7.0	4.7	1'2		
	14,640					.65		7.5	95	7.0	5.3	5.0	14,640				93	7.05	5.0	3'7		
	15,860					.39		7.6	95	7.0	4.8	5.0	15,860				9[illegible]	7.0	4.8	2'7		
	14,640	108 G / 13.45 s				.71		7.5	95	7.0	4.8	5.0	14,640				94	7.1	4.5	1'6		
	13,420					.73		7.6	95	7.1	4.6	5.0	13,420				94	7.0	4.3	3'6		
	14,640					.59		7.8	95	7.0	4.9	5.0	14,640				94	7.05	4.8	2'7		
	15,860					.62		7.4	95	6.85	5.4	5.0	15,860				94	6.9	5.0	1'7		
	18,300	17.2 s				1.18		7.5	95	6.8	4.8	5.0	18,300				94	6.9	4.4	3'3		
	15,860					1.34		7.6	95	7.0	5.8	5.0	15,860				94	7.0	5.2	2'6		
	19,520					1.02		7.9	95	7.0	4.9	5.0	19,520				95	6.9	4.6	3'10		
	13,420	113 G / 15.4 s				.89		7.2	95	6.95	5.1	5.0	13,420				95	7.1	4.8	2'6		
	17,080					1.0		7.6	95	7.0	5.2	5.0	17,080				95	7.1	5.0	1'7		
	15,860					.74		7.6	95	7.0	5.0	5.0	15,860				94	6.95	5.0	2'9		
	21,960	14.7 s				.73		7.4	95	7.0	5.5	5.0	21,960				94	7.0	5.3	1'8		
	17,080					.73		7.8	95	6.9	5.8	5.0	17,080				94	7.05	5.4	2'3		
	13,420					1.59		7.5	94	7.0	5.6	5.0	13,420				95	7.1	5.3	1'1		
	17,080	[illegible].7 s				1.15		7.6	95	7.0	5.1	5.0	17,080				94	7.1	4.8	1'11		
	10,980	129 G				.89		7.8	95	7.0	5.5	5.0	10,980				94	7.1	5.3	9"		
	13,420					1.25		7.6	95	7.0	4.7	5.0	13,420				94	7.05	4.6	2'3		
	15,860					.56		7.4	94	7.0	4.9	5.0	15,860				95	7.1	4.5	1'4		
	18,300	13.0 s				.97		7.8	94	7.0	5.2	5.0	18,300				94	7.05	4.8	2'8		
	14,640					.91		7.5	95	7.0	5.5	5.0	14,640				94	7.0	5.5	1'5		
	12,200					.76		7.7	95	7.0	5.3	5.0	12,200				93	7.1	5.0	3'7		
												5.0										
	15,900	118 G / 13.0 s				.82		7.58	94.9	6.97	5.1	5.0	15,900				94.4	7.04	4.83			
	21,960	129 G / 17.2 s				1.54		7.9	95	7.1	5.8	5.0	21,960				95	7.1	5.5			
	12,200	105 G / 10.6 s				.39		7.2	94	6.8	4.5	5.0	12,200				92	6.9	4.3			
	477,020	471 G / 104 s											477,020									

AGE TREATMENT PLANT
HLY OPERATION REPORT

MONTH Nov. 1967

					DIGESTER NO. 1				DIGESTER NO. 2								
Influent pH	Temp.	P.h.	Pressure	~~Cu-ft-Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To			Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		Mahoning Sewage Flow G.P.D.
7.5	95	7.0	4.5	5.0	15,860				94	7.1	4.4	2'10					454,200
7.5	95	6.9	4.6	5.0	19,520				94	7.1	4.4	1'9			46,360		444,400
77	95	70	5.1	5.0	15,860				94	7.1	4.9	3'7					442,200
74	95	70	5.3	5.0	17,080				94	71	52	2'6					434,400
7.6	95	70	4.9	5.0	14,640				94	7.05	4.7	1'4			46,360		378,900
76	95	6.9	4.7	5.0	18,300				92	70	4.3	3'6					447,800
77	95	6.9	48	5.0	15,860				93	70	4.5	2'3					318,600
75	95	6.9	5.0	5.0	15,860				93	70	4.7	1'2			51,240		413,400
7.5	95	7.0	53	5.0	14,640				93	7.05	5.0	3'7					422,500
76	95	70	48	5.0	15,860				93	70	48	2'7					412,900
75	95	70	48	5.0	14,640				94	71	45	1'6			43,920		424,100
76	95	71	46	5.0	13,420				94	7.0	43	3'6					353,200
78	95	70	4.9	5.0	14,640				94	7.05	4.8	2'7					436,400
74	95	6.85	5.4	5.0	15,860				94	6.9	5.0	1'7			40,260		396,600
75	95	6.8	48	5.0	18,300				94	6.9	44	3'3					403,900
76	95	70	5.8	5.0	15,860				94	7.0	5.2	2'6			42,700		404,600
79	95	7.0	44	5.0	19,520				95	6.9	46	3'10					405,300
72	95	6.95	51	5.0	13,420				95	7.1	48	2'6					427,100
76	95	70	5.2	5.0	17,080				95	71	5.0	1'7			37,160		361,200
76	95	7.0	5.0	5.0	15,860				94	6.95	5.0	2'9					430,600
7.4	95	70	55	5.0	21,960				94	70	53	1'8			30,500		390,400
78	95	69	5.8	5.0	17,080				94	7.05	5.4	2'3					424,800
75	94	70	5.6	5.0	13,420				95	71	5.3	1'1			25,620		358,800
76	95	70	5.1	5.0	17,080				94	7.1	48	1'11					404,400
78	95	70	5.5	5.0	10,980				94	71	5.3	9"			32,940		403,600
76	95	70	47	5.0	13,420				94	7.05	46	2'3					373,000
7.4	94	70	4.9	5.0	15,860				95	71	45	1'4			35,380		440,100
7.8	94	7.0	5.2	5.0	18,300				94	7.05	48	2'8					395,700
75	95	7.0	5.5	5.0	17,080				94	7.0	5.5	1'5			39,040		401,500
7.7	95	7.0	5.3	5.0	12,200				93	71	5.0	3'1					413,900
				5.0													
7.58	94.9	6.97	5.1	5.0	15,900				94.4	7.04	4.83				39,040		407,370
79	95	7.1	5.8	5.0	21,960				95	71	5.5				51,240		454,000
72	94	6.8	4.5	5.0	12,200				92	6.9	4.3				25,620		318,600
					477,020										468,440		12,221,100

Date	DIGESTER NO. 8 Temp.	P.h.	Pressure	Cover Fl.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To Harvey Beck	Driver	Average Raw Sludge pH	SHIFT OPERATORS Int. for Reg. Time and add overtime if any Day	Afternoon	Night
1	77	7.0	4.2	1'7			4880	HARV	6.2	RAY	ROGER	BOB
2	76	.95	43	3'1					6.2	"	"	"
3	79	71	48	0'4"					6.2	"	"	"
4	78	6.95	51	1'4					6.6	"	"	ROSE
5	76	7.05	45	3'0					6.2	"	"	"
6	77	7.0	45	4'8			2440	"	6.1	GORDON	"	GEO
7	76	7.0	4.7	1'4			14,640	"	6.6	"	"	"
8	77	7.05	49	3'5			15,860	"	5.8	"	RAY	"
9	77	7.05	5.6	1'2			14,640	"	5.8	"	"	"
10	77	6.95	46	2'0					5.8	"	"	RICH
11	-	-	44	3'2					6.6	"	"	ROSE
12	75	7.0	43	8"					5.8	"	"	"
13	75	7.0	46	8			13,420	"	5.9	ROGER	"	"
14	75	70	48	2'7			9,760	"	5.9	"	"	"
15	74	6.95	4.35	6"			14,640	"	5.8	"	GORDON	"
16	76	7.1	4.9	2'6			10,980	"	5.6	"	"	GEO
17	77	7.0	4.5	4"					6.0	"	"	"
18	75	70	4.8	4"					5.9	"	"	GEO
19	75	70	4.8	2'0					5.9	"	"	"
20	76	68	49	4"					5.8	RAY	"	"
21	72	69	5.2	1'5					6.1	"	"	"
22	75	7.1	5.0	4"					6.1	"	ROGER	"
23	76	6.95	51	1'5					6.2	"	"	"
24	75	7.05	47	4"					.2	"	"	ROSE
25	72	70	5.3	1'11					6.1	"	"	GEO
26	75	7.0	45	4"					6.6	"	"	GEO
27	74	7.0	48	1'4					6.0	GORDON	"	ROSE
28	73	70	4.8	4"					6.2	"	"	"
29	-	-	5.6	2'0					5.4	"	RAY	"
30	74	7.0	4.9	4"					5.9	"	"	"
31												
Ave.	75.6	6.98	4.74						6.0			
Max.	79	7.1	5.3				15,860		6.2			
Min.	72	6.8	4.2				2,440		5.8			
Totals							101,260					

11-28-67	Raw Sludge	#1	#2	#3
		Bottom		
% Total Solids	4.48	34.76	34.47	9.5
% Fixed	17.18	76.24	77.97	41.2
% Volatile	82.82	23.76	22.03	58.9

Cu. Ft. Digested Sludge Pumped T
This Month

Drying Bed No.
Drying Time—D
Final Disposal to

Drying Bed No. 2
Drying Time—D
Final Disposal to

Drying Bed No. 3
Drying Time—D
Final Disposal to

Drying Bed No. 4
Drying Time—D
Final Disposal to

Drying Bed No. 5
Drying Time—day
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To
Composite S
Inf = 8:0
Eff = 8:0
Flow = 3,73
Clarifier Te
B.O.D. - Inf 3
Sep S - Inf
Turb - Inf 3
Susp S = Inf
PH Inf

263 264

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

Day	Afternoon	Night
RAY	ROGER	BOB
"	"	"
"	"	"
"	"	ROSE
"	"	"
GORDON	"	GEO
"	"	"
"	RAY	"
"	"	"
"	"	RICH
"	"	ROSE
"	"	"
ROGER	"	"
"	"	"
"	GORDON	"
"	"	GEO
"	"	"
	"	GEO
"	"	"
RAY	"	"
"	"	"
"	ROGER	"
"	"	"
"	"	ROSE
"	"	GEO
"	"	GEO
GORDON	"	ROSE
"	"	"
"	RAY	"
"	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time—Days
Final Disposal to

Drying Bed No. 2
Drying Time—Days
Final Disposal to

Drying Bed No. 3
Drying Time—Days
Final Disposal to

Drying Bed No. 4
Drying Time—Days
Final Disposal to

Drying Bed No. 5
Drying Time—days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To MONTHLY TEST 11-30-67
COMPOSITE SAMPLES - HOURLY
INF = 8:00 A.M. → 4:00 P.M.
EFF = 8:00 P.M. → 8:00 A.M.
FLOW = 3,736,000 G.P.D.
CLARIFIER TIME = 4 HR. 41 MIN.
B.O.D. - INF 385.0, EFF 138.75, RED 63.96 %
SET S - INF 8.0, EFF .03 ppm. RED 99.62 %
TURB - INF 20, EFF 11 ppm. RED 45 %
SUSP S - INF 284 ppm, EFF 109 ppm, RED 61.62 %
PH INF 7.3, EFF 7.5

REMA

NOV 7 BOILER = 3 GR/GAL HARD
HEAT EXCHANGER = 4 GR/GA

NOV 16 PUMPS PUT ON NEW O

NOV 20 CHECKED CHLORINE CONTRACT

NOV. 21 SCUM BREAKERS PATCHED

CITY GAS
11-1-67 → 12-1-67 = 246,500

N. MANKATO SE
OUR METER = 12,221,000 GAL
THEIR METER: 11,303,000 "

CHLORI
NOV. 16 LYON'S PICKED
6 HARKIN'S BRIGHT

11-28-67	RAW SLUDGE	#1	#2	#3	#1	#2	#3	#1	#2	#3	SUPERNATANT
		BOTTOM			5' OFF BOTTOM			10' OFF BOTTOM			
% TOTAL SOLIDS	4.44	34.76	34.47	9.59	1.43	.97	.3	1.45	.48	.3	.29
% FIXED	17.18	76.24	77.97	41.23	36.72	38.11	43.26	37.11	38.76	42.	41.53
% VOLATILE	82.82	23.76	22.03	58.77	63.28	61.89	56.74	62.89	61.24	58.	58.47

Operator in Charge
Ralph R.

	REMARKS
gested nped To h	
d No. 1 me—Days posal to	Nov 7 Boiler = 3 Gr/Gal Hardness, pH 9.3 Heat Exchanger = 4 Gr/Gal, pH 8.6
d No. 2 me Days posal to	Nov 8 Yonic E. Co. New O2 Prob, Cal Solenoid & Prob Cleaning Nov 20 Cleaned Chlorine Contact Tank (Bypass 15% of Sewage)
d No. 3 me—Days posal to	Nov 21 Sinkhorst Patched #1 Digester C.E.R. Co. Warranty
d No. 4 me—Days posal to	City Gas Meter 11-1-67 → 12-1-67 = 246,500 Cu. Ft. in Nov. N. Mankato Sewage Flow Our Meter = 12,221,100 Gal. Their Meter: 11,303,000 "
d No. 5 me—days posal to	Chlorine Nov. 16 Lyon's Picked Up 5 MT Cylinders 6 Hawkins Brought 5 Full Cylinders [illegible]
posal to	
t	

Monthly Test 11-30-67
…ite Samples - Hourly
…: 8:00 A.M. → 4:00 P.M.
…= 5:00 P.M. → 8:00 A.M.
…3,036,000 G.P.D.
…es Time = 4 Hr. 41 Min.
…Inf. 383 ppm, Eff. 134.75, Red. 65.96 %
…Inf. 8.0, Eff. .03 ppm. Red. 99.62 %
…Inf. 20, Eff. 11 ppm. Red. 45 %
…Inf. 284 ppm Eff. 109 ppm Red. 61.62%
…Inf. 7.3, Eff. 7.5

…	#3	#1	#2	#3	#1	#2	#3	Super
…e M		5' Off Bottom			11' Off Bottom			natant
…47	9.59	1.43	.97	.3	1.45	.48	.3	.29
…49	41.23	36.22	38.11	43.26	37.11	38.26	42.	41.53
…03	58.99	63.28	61.59	56.74	62.69	61.24	58.	58.47

Operator in Charge

Ralph R. Rader

CITY OF MANKATO

SEWAGE TREA
MONTHLY OPE

GENERAL

Day of Week	Date	Weather	Wind Dir. & Vel.	Temp. of Air Max./Min.	Temp. of Sewage Influent	Sewage Flow G.P.D.	Ch. Used	Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	B.O.D. Inf.	B.O.D. Ef.	Ch. Res. EF.		Influent pH	Temp.
	1	Cl	S	35/31	63	3,360,000		14,640	12.6 S				.67		7.4	94
	2	Cl	N-W	33/14	63	3,579,000		12,040	5.3 S / 112 G				1.05		7.6	95
	3	C	S	48/26	64	3,232,000		13,420					1.05		7.5	93
	4	C	E-SE	47/15	63	3,880,000		18,300					.91		7.7	97
	5	PCl	W-NW	42/17	64	3,750,000		14,640	12.9 S				1.10		7.5	93
	6	Cl	E-NE	38/28	64	3,700,000		17,080					1.38		7.6	94
	7	Cl	N-NW	41/30	62	3,810,000		15,860					.78		7.5	95
	8	Cl	E-NE	37/31	62	3,620,000		15,860	15.8 S				.49		7.9	95
	9	Cl	E-NE	34/28	62	3,600,000		19,520	2.8 S / 137 G				.80		7.4	94
	10	Cl	N-NE	32/25	62	3,256,000		18,300					1.15		7.3	94
	11	Cl	SW	33/25	63	3,877,000		15,860					.88		7.5	95
	12	PCl	NW	31/13	62	3,830,000		17,080	13.3 S				.77		7.7	95
	13	C	SW	37/8	63	3,777,000		17,080					.66		7.6	95
	14	Cl	NW	18/2	63	3,729,000		18,300					.66		7.6	97
	15	C	W-NW	32/3	64	3,434,000		9,760	13.4 S				.71		7.4	94
	16	PCl	SW	36/14	63	3,246,000		21,960	135 G				.85		7.7	95
	17	Cl	SE	38/25	64	2,891,000		13,420					.92		7.3	94
	18	PCl	SW	35/13	63	3,462,000		14,640					1.01		7.5	94
	19	PCl	NE	35/32	62	3,339,000		15,860	14.7 S				.63		7.6	94
	20	Cl	SE	54/13	62	3,329,000		14,640					.96		7.6	94
	21	Cl	NW	17/0	63	3,391,000		12,200					.63		7.4	94
	22	Cl	N-NW	8/-1	62	3,355,000		15,860	16.0 S				.56		7.3	94
	23	Cl	NW	34/12	63	3,044,000		10,980	2.6 S / 376 G				.57		7.3	94
	24	Cl	SE	42/11	64	2,811,000		9,760					1.09		7.2	95
	25	C	N-NW	16/-4	60	2,620,000		10,980					1.56		7.5	93
	26	C	S-SW	19/-6	60	3,360,000		18,300					.57		7.5	94
	27	Cl	W-NW	11/-1	59	3,356,000		13,420	13.0 S				.93		6.95	92
	28	Cl	Calm	20/10	60	3,085,000		15,860					.79		7.3	93
	29	Cl	S-SW	17/4	62	2,929,000		14,640	9.4 S				.96		7.4	93
	30	PCl	W-NW	12/-20	62	2,630,000		13,420					.71		7.45	94
	31	C	N-NW	8/-22	59	2,390,000		13,420					1.52		7.6	94
Ave.				29.2/12.4	62.3	3,351,000		15,152					.90		7.5	94
Max.				54/32	64	3,880,000		21,960					1.56		7.9	95
Min.				8/-22	59	2,390,000		9,760					.49		7.2	92
		Totals				103,881,000										

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH De

			B.O.D.				DIGESTER NO. 1						DIGESTER N						
Sludge G.P.D.	Grit and Screenings Cu. Ft.	Scum Cu. Ft.	Enf.	Ef.	Ch. Res. EF.	Influent pH	Temp.	P.h.	Pressure	Cu ft Gas Produced	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To	Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gal. Di
14,640	12.0 S				.67	7.4	94	7.0	4.9	5.0	14,640		93	7.0	4.8	2'3			
12,080	5.3 S 112 G				1.25	7.6	95	6.9	5.2	5.0	12,080		93	7.0	5.0	1'3			
13,420					1.05	7.5	93	7.1	4.9	5.0	13,420		94	7.0	4.9	3'7			
18,300					.91	7.7	94	7.0	5.0	5.0	18,300		93	7.1	4.7	2'8			
14,640	12.9 S				1.10	7.5	93	7.0	5.2	5.0	14,640		95	7.0	5.0	1'5			
12,080					1.38	7.6	94	7.05	4.8	5.0	12,080		94	7.05	4.9	3'11			
15,860					.78	7.8	95	7.0	5.2	5.0	15,860		94	7.0	5.5	2'9			
15,860	15.9 S				.79	7.9	95	7.0	5.0	6.0	15,860		94	7.1	4.9	1'8			
19,520	2.8 S 137 G				.80	7.7	94	7.0	5.0	5.0	19,520		93	7.1	4.8	4'2			
18,300					1.15	7.3	94	7.0	5.0	5.0	18,300		94	6.95	4.7	2'6			
15,860					.85	7.5	95	7.0	5.2	5.0	15,860		93	7.05	5.0	1'7			
14,640	13.3 S				.77	7.7	95	7.0	5.1	7.5	14,640		94	7.1	4.9	4'1			
12,080					.66	7.6	93	7.0	5.5	5.0	12,080		93	7.1	5.2	3'1			
18,300					.66	7.6	94	7.0	5.2	7.0	18,300		95	7.1	4.9	1'11			
9,760	13.4 S				.71	7.4	94	7.0	5.1	7.0	9,760		94	7.1	5.0	3'10			
21,960	135 G				.80	7.7	95	7.0	4.8	7.0	21,960		94	7.05	4.8	3'2			
13,420					.92	7.3	94	6.95	5.6	8.0	13,420		94	7.1	4.8	1'8			
14,640					1.01	7.5	94	7.0	4.9	7.0	14,640		94	7.1	4.6	3'11			
15,860	14.7 S				.63	7.6	94	7.0	4.8	7.0	15,860		94	7.0	4.6	2'11			
14,640					.96	7.6	94	7.0	4.7	7.0	14,640		94	7.0	4.5	1'10			
12,200					.63	7.4	94	7.0	5.0	6.0	12,200		95	7.0	4.8	3'10			
15,860	16.0 S				.56	7.3	94	7.0	5.0	7.0	15,860		94	7.0	4.9	3'0			
16,980	2.6 S 370 G				.57	7.2	94	–	5.4	6.8	16,980		94	–	4.9	1'11			
9,760					1.09	7.2	95	–	4.9	8.0	9,760		93	–	4.6	1'2			
16,980					1.56	7.5	93	–	4.2	8.0	16,980		94	–	4.0	3'10			
18,300					.57	7.5	94	–	4.6	7.0	18,300		93	–	3.6	3'1			
13,420	13.0 S				.93	6.95	92	–	4.4	8.0	13,420		94		4.5	1'10			
15,860					.79	7.3	93	–	4.9	6.0	15,860		93	–	4.7	4'5			
14,640	9.4 S				.96	7.4	93	–	4.8	6.0	14,640		93	–	4.6	3'4			
13,420					.71	7.45	94	–	5.2	7.0	13,420		92	–	4.8	2'4			
13,420					1.52	7.6	94	–	5.3	7.0	13,420		93	–	4.7	1'5			
15,152			...	—	.90	7.5	94	7.0	4.97	6.37	15,152		93.7	7.05	4.75				
21,960				—	1.56	7.9	95	7.1	5.5	8.0	21,960		95	7.1	5.5				
9,760					.47	7.2	92	6.9	4.2	5.0	9,760		92	6.95	3.6				
											469,700								

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SEWAGE TREATMENT PLANT
MONTHLY OPERATION REPORT

MONTH Dec 1967

		DIGESTER NO. 1							DIGESTER NO. 2								
	Influent pH	Temp.	P.h.	Pressure	~~Cu ft Gas Produced~~ Level	Gal. Raw Sludge Added	Gal. Digested Sludge Removed To		Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To #3		North Mankato Sewage Flow G.P.D.
	7.4	94	7.6	4.9	5.6	14,640			93	7.0	4.8	2'3					477,600
	7.6	95	6.9	5.2	5.0	12,080			93	7.0	5.0	1'3			51,240		425,900
	7.5	93	7.1	4.9	5.6	13,420			94	7.0	4.9	3'7					365,400
	7.7	97	7.0	5.0	5.6	18,300			93	7.1	4.7	2'8					435,600
	7.5	93	7.6	5.2	5.6	14,640			95	7.0	5.0	1'6			51,240		411,200
	7.6	94	7.65	4.8	5.6	12,080			94	7.05	4.9	3'11					397,000
	7.5	95	7.6	5.2	5.6	15,860			94	7.0	5.5	2'9					426,500
	7.9	95	7.0	5.6	6.0	15,860			94	7.1	4.9	1'8			52,460		430,700
	7.4	94	7.6	5.6	5.6	14,520			93	7.1	4.8	4'2					448,100
	7.3	94	7.6	5.6	5.0	14,300			94	6.95	4.7	2'6					370,200
	7.5	95	7.0	5.2	5.6	15,920			93	7.05	5.0	1'7			52,460		446,400
	7.7	95	7.6	5.1	7.5	14,040			94	7.1	4.9	4'1					420,460
	7.6	95	7.6	5.5	8.0	12,080			93	7.1	5.2	3'1					415,600
	7.6	97	7.0	5.2	7.6	18,300			95	7.1	4.9	1'11			46,360		424,460
	7.4	97	7.6	5.1	7.6	9,760			94	7.1	5.0	3'6					417,460
	7.7	95	7.0	4.8	7.6	21,960			94	7.05	4.8	3'2					424,460
	7.3	94	6.95	2.6	8.0	13,420			94	7.1	4.8	1'8			46,360		378,160
	7.5	94	7.6	4.9	7.6	14,640			94	7.1	4.6	3'11					439,700
	7.6	94	7.6	4.8	7.6	15,860			94	7.0	4.6	2'11					417,200
	7.6	94	7.6	4.7	7.6	14,640			94	7.0	4.5	1'6			43,420		411,660
	7.4	94	7.6	4.6	6.6	12,200			95	7.0	4.8	3'6					446,600
	7.3	94	7.6	5.6	7.6	15,860			94	7.0	4.9	3'0					432,600
	7.3	94	–	5.4	6.8	10,980			94		4.9	1'11					465,600
	7.2	95	–	4.9	8.0	9,760			93	–	4.6	1'2			44,400		355,900
	7.5	93	–	4.7	8.6	10,980			92	–	4.0	3'6					332,200
	7.5	94	–	4.6	7.6	18,300			93	–	3.6	3'1					433,200
	6.95	92	–	4.4	8.6	13,420			94		4.5	1'6			51,240		420,200
	7.3	93	–	4.9	6.6	15,860			93	–	4.7	4'5					415,900
	7.4	93	–	4.8	6.6	14,640			93	–	4.6	3'4					426,900
	7.45	94	–	5.2	7.6	13,420			92	–	4.8	2'4					424,200
	7.6	94	–	5.3	7.6	13,420			93	–	4.7	1'5			54,900		378,200
	7.5	94	7.6	4.97	6.37	15,152			93.7	7.05	4.75				49,898		414,390
	7.9	95	7.1	5.5	8.0	21,960			95	7.1	5.5				54,900		477,600
	7.2	92	6.9	4.3	5.0	9,760			92	6.95	3.6				43,420		332,200
						469,700									494,940		12,846,200

①

	DIGESTER NO. 8									SHIFT OPERATORS Int. for Reg. Time and add overtime if any		
Date	Temp.	P.h.	Pressure	Cover El.	Cu. Ft. Gas Produced	Gal. Raw Sludge Added	Gals. Digested Sludge Removed To		Raw Sludge pH	Day	Afternoon	Night
1	74	7.05	4.8	2'2					5.8	Gordon	Ray	Rose
2	-	-	4.9	4'3					5.8			"
3	72	7.0	4.8	"					5.9	"		
4	74	7.15	4.7	2'2					6.1	Roger	"	
5	-	-	5.0	4'5					6.1		"	
6	75	7.1	4.7	"					5.8		Gordon	
7	75	7.0	4.7	1'6					5.8		"	
8	74	7.05	4.9	3'4					5.8		Hary	
9	76	7.1	4.7	8"					6.0		Gordon	"
10	76	7.0	4.6	1'11					5.8		"	Rich
11	-	-	5.0	4'1					6.0	Ray	"	Rose
12	78	7.0	4.9	16"					5.8	"	"	"
13	76	7.05	5.2	2'6					6.2	"	Roger	"
14	-	-	4.9	4'5					6.1	"		"
15	78	7.1	4.9	1'3					6.2	Hary		"
16	75	6.95	4.6	2'6					6.0	Ray		Bob
17	-	-	4.8	4'4					5.9	"		
18	75	7.0	4.6	1'3			Brooks		6.1	Gordon		
19	74	6.95	4.8	2'8			7,320		6.0	"	"	"
20	-	-	4.5	3'8			10,980		6.0	"	Ray	"
21	74	7.0	4.8	1'5			14,640		-			"
22	73	7.0	4.7	3'5			—		-	Hary		
23	-	-	4.8	4'5					-	Gordon		Rose
24	-	-	4.7	4'5					-	"		"
25	72	-	3.8	1'1					-	Roger		Bob
26	71	-	3.4	1'1					-	"		
27	71	-	4.6	3'6					-	"	Gordon	
28	73	-	4.5	16"					-	Hary		
29	72		4.5	2'6					-	"		"
30	-		4.8	4'2					-	Roger		Gel
31	-		4.9	4'3					-	"	"	"
Ave.	74.2	7.03	4.69						5.96			
Max.	78	7.15	5.2						6.2			
Min.	71	6.95	3.4						5.8			
Totals							32,940					

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time– Days
Final Disposal to

Drying Bed No. 2
Drying Time– Days
Final Disposal to

Drying Bed No. 3
Drying Time– Days
Final Disposal to

Drying Bed No. 4
Drying Time– Days
Final Disposal to

Drying Bed No. 5
Drying Time –days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To Mon
Clarifier Sa
Inf. 5.00
Eff. 5.60
Flow = 3,786,000
Clarifier Time
B.O.D. - Inf. 237
Sed S. - Inf. 20
Turb. - Inf. 26
Sus S. Inf. 254
pH - Inf. 7.7.

12-6-67	Raw Sludge	#1	#2	#3	#
		Bottom			5
% Total Solids	4.39	33.94	26.00	5.66	1.
% Fixed	18.29	76.14	75.65	42.4	36
% Volatile	81.71	23.86	24.35	57.6	63

SHIFT OPERATORS

Int. for Reg. Time and add overtime if any

Day	Afternoon	Night
Gordon	Ray	Rose
"		"
"		
Roger		
	Gordon	
"		
	Hary	
	Gordon	"
	"	Rich
Ray	"	Rose
"	"	
"	Roger	"
"		"
Hary		"
Ray		Dee
"		
Gordon		"
"		"
"	Ray	"
		"
Hary		
Gordon		Rose
"		"
Roger		Dee
"		"
"	Gordon	"
Hary		
"		"
Roger		Dee
"	"	"

Cu. Ft. Digested Sludge Pumped To This Month

Drying Bed No. 1
Drying Time - Days
Final Disposal to

Drying Bed No. 2
Drying Time - Days
Final Disposal to

Drying Bed No. 3
Drying Time - Days
Final Disposal to

Drying Bed No. 4
Drying Time - Days
Final Disposal to

Drying Bed No. 5
Drying Time - days
Final Disposal to

Lagon
Final Disposal to

Hauled Out
To

Monthly Test 12-6-67
Composite Samples - Hourly
Inf. 8:00 AM → 4:00 PM
Eff. 8:00 AM → 8:00 A.M
Flow = 3,750,000 G.P.D.
Detention Time = 4 Hr 43 Min.
B.O.D. - Inf. 233 ppm, Eff. 112 ppm, Red. 51%
Set. S. Inf. 9.0 ml/l, Eff. 0.3 ml/l,
Turb. - Inf. Cloudy, Eff. Cloudy
Susp. S. Inf. 254 ppm, Eff. 106 ppm, Red 58.4%
pH - Inf. 7.7, Eff. 7.6

12-6-67	Raw Sewage	#1	#2	#3	#1	#2	#3	#1	#2	#3	Free Heights
		Bottom			5' Off Bottom			10' Off Bottom			
% Total Solids	4.39	33.94	26.00	5.66	1.61	.96	1.64	1.32	.96	.30	.30
% Fixed	18.29	76.14	75.65	42.4	36.97	38.53	40.64	36.74	38.33	44.96	42.41
% Volatile	81.71	23.86	24.35	57.6	63.03	61.47	59.36	63.26	61.67	55.04	57.59

Ⓑ

REMARKS

City Gas
243,266 Cu. Ft. Used In Dec

No. Mankato Sew
Our Meter = 12,446,200 Gal.
Their Meter: 11,656,500 Gal.

Chlorine
Dec: 13 = Received 5 Cyl. Return

Boiler
3 Gr./Gal. Hardness, pH
Heat Exchanger
2 Gr./Gal. Hardness, pH

12-8-67 Put 4 Qt. Of Boiler
12-21-67 Changed Line To F
12-23 " " " G
12-25 " " " F
12-28 " " " G
12-30 " " " F

Operator in Charge
Ralph R. K

Ft. Digested
ge Pumped To
Month

Bed No. 1
Time Days
Disposal to

Bed No. 2
Time Days
Disposal to

Bed No. 3
Time Days
Disposal to

Bed No. 4
Time Days
Disposal to

Bed No. 5
Time days
Disposal to

Disposal to

Out

Monthly Test 12-6-67
posite Samples - Hourly
Inf. 8:00 AM → 4:00 PM
Eff. 8:00 AM → 8:00 AM
= 3,780,000 G.P.D.
ention Time = 4 Hr 43 Min.
D - Inf. 228 ppm, Eff. 111.25 ppm, Red. 51%
S. - Inf. [illegible] ml/l, Eff. 0 ml/l,
: Inf. [illegible] ml/l, Eff. [illegible] ml/l
S Inf. 254 ppm, Eff. 106 ppm, Red. 58.4%
: Inf. 7.7, Eff. 7.6

	#2	#3	#1	#2	#3	#1	#2	#3	Surface
ttom			5' Off Bottom			10' Off Bottom			Height
	96.00	5.60	1.61	.96	1.64	1.32	.96	.30	.30
	35.65	42.4	36.97	38.53	40.64	36.74	38.33	44.96	42.41
	24.35	57.6	63.93	61.47	58.36	63.26	61.67	55.04	57.59

REMARKS

City Gas Meter
243,200 Cu. Ft. Used In December.

N. Mankato Sewage Flow
Our Meter = 12,446,200 Gal.
Their Meter: 11,656,500 Gal.

Chlorine
Dec: 13 = Received 5 Cyl. & Returned 5 Empties - Jones

Boiler
3 Gr/Gal Hardness, pH 9.5
Heat Exchanger
2 Gr/Gal Hardness, pH 8.4

12-8-67 Put 4 oz. Of Boiler Compound In Heat Exchanger
12-21-67 Changed Over To Fuel Oil On Boiler
12-23 " " " Gas " "
12-25 " " " Fuel Oil " "
12-28 " " " Gas " "
12-30 " " " Fuel Oil " "

Operator in Charge
Ralph R. Rader

268-A

DATE: JULY 31, 1968

RIVER LEVEL: 3.5'

APPROX. RIVER LOCATION	WATER TEMP. C°	D.O.	TURB.
Minn. River above Sibley Park	27°	7.5	55.0
Blue Earth River Hwy. 169 Bridge			
Blue Earth River At Park	27°	8.1	42.5
"A" Street Lift Station	27°	9.35	39.0
Rock Street	27°	8.9	45.0
Below Treatment Plant	27°	8.8	55.5
Rendering Plant	27°	7.86	
Below N.S.P. Plant	27°	7.86	57.5
River next to Hwy 169	25.5°	8.6	60.0

28-B

DATE: JULY 7, 1967

RIVER LEVEL: 8.1'

APPROX. RIVER LOCATION	WATER TEMP. C°	D.O.	TURB.
Minn. River above Sibley Park	20.6°	6.66	78.3
Blue Earth River Hwy. 169 Bridge	20.0°	8.38	80.0
Blue Earth River At Park	20.0°	8.33	88.00
"A" Street Lift Station	20.0°	7.17	91.6
Rock Street	20.0°	7.38	88.3
Below Treatment Plant	20.0°	7.20	85.0
Rendering Plant	20.0°	7.35	93.3
Below N.S.P. Plant	21.0°	7.42	93.3
River next to Hwy 169	20.0°	7.58	100.0

268-C

SEWAGE TREATMENT PLANT

Statistical Report	1966	1967
January	103,332,200 gal.	99,439,000 gal.
February	104,153,600 gal.	93,887,000 gal.
March	113,193,200 gal.	117,801,000 gal.
April	125,859,800 gal.	185,154,600 gal.
May	121,119,600 gal.	163,848,800 gal.
June	121,576,000 gal.	124,292,400 gal.
July	105,886,000 gal.	112,248,800 gal.
August	99,883,600 gal.	99,656,400 gal.
September	96,645,400 gal.	87,654,600 gal.
October	112,690,000 gal.	95,543,000 gal.
November	109,750,000 gal.	109,538,000 gal.
December	98,026,000 gal.	103,881,000 gal.
Totals	1,312,115,400 gal.	1,392,944,600 gal.
Average Daily Pumpage	3,594,800 gal.	3,816,286 gal.
Average Monthly Pumpage	109,342,000 gal.	116,078,710 gal.

Total Pumpage increased 5.8%

Average monthly flows of North Mankato (14,803,645 gal. or approximately 12.75% of total pumpage)

Sampling Analysis

Statistical Report	1966	1967
Average Temp. of Plant Influent	61.5 F	62.1 F
Average P H of raw sewage	7.36	7.5
Average moisture content raw sludge	95.5%	95.55%
Average total solids raw sludge	4.5%	4.45%
Volatile solids of sludge	79.91%	79.45%
Fixed solids of sludge	20.09%	20.55%
Average B.O.D. Reduction	53.34%	52.06%
Totalvarious sewage samples tested	4,255	4,018
Plant effluent Ch Residual		7.23 P.P.M.
Plant effluent Suspended Solids		88.3 P.P.M.
Plant effluent Turbidity		13.8
BOD Plant Ifluent		217.25 P.P.M.

Coliform test Equip. purchased, prior to 1st of year and testing started February, 1968.

MR. BADALICH: I have another letter, Mr. Chairman.

MR. STEIN: Let's see if we have any questions or comments on that.

MR. POSTON: Did I understand correctly that the City of Mankato does not intend to comply with the treatment requirements schedule?

MR. BADALICH: It seems like they do intend to comply with the recommendations, Mr. Poston, but I guess the time schedule is something that they feel at this time they cannot comply with.

MR. STEIN: They intend to comply a little late?

MR. BADALICH: Yes. We required that the preliminary plans be submitted approximately at this time. But this has not been done.

MR. STEIN: Let me ask: If this is done, do you think that, considering the City of Mankato's problem, they can be in construction and operation by June of 1971?

MR. BADLICH: I would think so, Mr. Chairman. If they do retain the consulting engineers which they do indicate - and they do have the preliminary plans in - I don't see any reason why they could not comply within the three-year period.

MR. STEIN: That is the operating date.

You know, on its face, it seems to me they have a very peculiar arrangement. They say they are not complying.

I don't know why they could not have had the engineer before this. They repeat over and over again they do not have a problem with combined sewage, and they have separated it. Generally, you put treatment first.

Now, I don't know what their combined sewage is. This may be a historical accident and they may be in shape, but just putting this off for another year and saying they can't possibly comply does not seem to me to make good sense.

If you feel you can bring them in line with this 1971 date with this year's lapse, maybe they can get on with it and go with the program, but it seems to me to be a most peculiar statement from the municipality.

I love Mankato. At one time I came down in one of these little airplanes years ago in Mankato, and was delighted to find that there was such a place around, but I think they really should provide treatment.

All right. If there are no further questions, will you go ahead?

MR. BADALICH: Very good, Mr. Chairman.

I have another letter dated April 23, 1968, which is addressed to the Minnesota Pollution Control Agency, to my attention.

"Dear Mr. Badalich:

"Since I will be unable to attend the conference,

Archer Daniels Midland Company

"I wish to submit, by letter, our current activities toward control of stream pollution.

"All our protein losses go to the sanitary sewer, and are treated by the city sewage treatment system. We are currently working within the plant to reduce this material to a minimum.

"We discharge through a storm sewer well water used through our cooling condensers, boiler blowdown water, and water used to backwash our water softeners. This is currently being sampled to obtain data on the amount of mineral in this water.

"We have also requested in our next fiscal-year budget beginning July 1, money for the construction of a settling basin to handle the blowdown water and backwash water from our water softeners.

"Sincerely yours,
ARCHER DANIELS MIDLAND COMPANY
/s/ Paul L. **Twedt**
Chemical Engineer."

They are located in Mankato, Minnesota.

MR. STEIN: What do you mean by "protein losses"?

MR. BADALICH: I think I would refer this question to Mr. Johannes. They would like to know what they mean by protein losses.

STATEMENT OF C. A. JOHANNES, POLLUTION CONTROL AGENCY, STATE OF MINNESOTA

MR. JOHANNES: My name is C. A. Johannes. I am on the staff of the Pollution Control Agency.

I am sure he is referring to the washwater from clean-up in the meal. This is a linseed oil mill, and he is talking about the protein, the dust, and that type of thing, from the meal.

MR. STEIN: This is just the washwater from a soybean?

MR. JOHANNES: That is right; which contains some protein in its material.

MR. STEIN: Sure, it contains some.

Thank you.

MR. BADALICH: Are there any other questions regarding this letter, Mr. Chairman?

MR. STEIN: No.

MR. GADLER: Is that a source of pollution?

MR. STEIN: Sure, it is pollution.

MR. GADLER: I just wanted to make sure.

MR. STEIN: You know, protein is a very popular word and we have it in all the diets. It is hard to find some of these organic wastes without any proteins, but I don't think there is any doubt that this is a pollutant. I don't think there is any question about it.

MR. BADALICH: Mr. Chairman, I would like to call on Mr. Maurice L. Robins, Chief Chemist for the Minneapolis-St. Paul Sanitary District, to present their report to the conference.

STATEMENT OF MAURICE L. ROBINS, P.E., CHIEF
CHEMIST AND SANITARY ENGINEER, MINNEAPOLIS-
ST. PAUL SANITARY DISTRICT, ST. PAUL, MINN.

MR. ROBINS: Mr. Chairman, Conferees, potential and fellow polluters:

At this time I will introduce myself. I am Maurice L. Robins, Chief Chemist and Sanitary Engineer for the Minneapolis-St. Paul Sanitary District.

It is my privilege to present this statement on behalf of the Board of Trustees and Mr. Kerwin L. Mick, our Chief Engineer and Superintendent of the Sanitary District, who happens to be out of town at this time and who delegated me to represent him at this hearing.

Since the time of the previous Federal Water Pollution Control Administration conference of February 1967, the Minneapolis-St. Paul Sanitary District has made very substantial progress in a program of water pollution control which is compatible with the recommendations of the FWPCA "Summary and

Pollution Abatement Recommendations." In the past fourteen months, the Sanitary District's accomplishments cover several of the major components of the pollution abatement plan. These include the following:

1. Construction of major treatment plant improvements, including secondary treatment and sludge disposal works.
2. Commencement of operation of the new secondary treatment and sludge disposal works.
3. Construction of a sewage regulator demonstration project.
4. Authorization and beginning of preliminary planning for a further plant expansion.
5. Authorization of planning for modifications to the original sludge incineration system, including air pollution control.

Information is presented in the following statement which clearly shows that the Sanitary District has accepted and dispatched its responsibilities for the abatement of pollution. The record verifies that the Sanitary District has proceeded on its own initiative on a large and costly program of plant and system improvements and that these works are substantially completed and in operation.

These achievements in the pollution control field are a continuation of the precedent established by the Sanitary District and the Twin Cities more than thirty years ago with the initiation of construction of the 52-mile interceptor sewer system and primary treatment plant with a total cost of $15.7 million. The plant was the first sewage treatment plant serving a major population center on the Mississippi, Missouri and Ohio Rivers. Several cities on the Mississippi River and Missouri River have only recently installed primary treatment facilities. Over the intervening period, the Sanitary District has spent over $21.3 million for operation and maintenance of the sewage treatment plant.

SEWAGE TREATMENT PLANT EXPANSION

Upon the completion of a preliminary investigation of sewage treatment requirements for the enlarged service area, the Sanitary District commenced the planning and construction of a major expansion program of the treatment plant to accomplish secondary treatment. The secondary treatment facilities consist of aeration tanks, final sedimentation tanks, air compression equipment and a chlorination contact basin. These works utilize the High-Rate Activated Sludge Process.

The general design basis was as follows:

Sewered Population	1,545,000 Persons
Industrial Population Equivalent	1,065,000 Persons
Total Population Equivalent	2,610,000 Persons

Average Annual Flow Thru Plant	218 million gallons per day
Removal of Suspended Solids	85 percent
Removal of Pollution Load with Basic Treatment Process (BOD)	75 percent
Control of Effect of Pollutional Load by Supplemental Methods	As required to meet river water quality standards
Destruction of bacteria as measured by coliform indicator organisms	99 percent

Sludge which is removed from the primary and secondary processes is subjected to thickening, vacuum filtration and incineration. The final product of the sludge disposal process is an inert ash which is utilized as land fill. Sludge disposal facilities employ the most advanced methods which result in efficient and economical operation. An air pollution control system is part of the incineration equipment, a feature which required an investment of approximately $1 million in order to eliminate the potential air pollution problem.

The total plant design is one with the unusual flexibility to permit the most effective use of the plant components in the sewage treatment process. Extensive use was made of modern process control techniques using instrumentation and data processing equipment.

Another notable feature of the new plant is adaptability to future expansion as is necessary. The secondary treatment facilities form one part of a long-range plan for the incremental expansion of the District plant. The site and arrangement of the treatment units has been planned for the future expansion of the plant to a capacity of more than 400 million gallons per day on the basis of the High-Rate Activated Sludge Process, the Step Aeration Process or other future developments.

The Sanitary District's sewage treatment plant ranks among the ten largest plants in the country in terms of its capacity. Forty-five suburban communities and four agencies are presently participants in sewage contracts with the Central Cities. With a tributary population of nearly 1.3 million persons, the Sanitary District treatment plant presently serves approximately 50 percent of the sewered population of the entire State of Minnesota. Present sewage flows average about 200 million gallons per day.

In 1962, the District commenced the construction of a $27 million program of expansion of the main treatement plant to accomplish secondary treatment and sludge disposal. Thirty construction contracts totaling over $25.3 million have been awarded. The present status and approximate contract amounts of the Sanitary District program are shown on the attached tabulation at the end of this report.

COMMENCEMENT OF OPERATION OF NEW PLANT

Secondary treatment facilities were initially placed in operation in April of 1966. However, because of the limitation of the capacity of the sludge disposal works, the utilization of the secondary plant was trimmed to a partial operation pending completion of the sludge disposal works.

During the operation of the new secondary plant, careful records have been kept of the performance of the plant and the efficiencies in terms of the biochemical oxygen demand and suspended solids removal. The operation of the secondary facilities over a period of nearly two years has demonstrated that the new works are fully capable of treatment in compliance with the design removals and that the sewage and industrial wastes of this metropolitan area are amenable to treatment by either the High-Rate or Conventional Activated Sludge Process. For a substantial part of the time, the plant operated at removals one or two percentage points better than that anticipated in the design.

The sludge thickening tanks, the sludge vacuum filters, the sludge incinerators, and the complex instrumentation and control system are now in test operation. These works, too, are performing successfully in accord with the design expectations.

The Sanitary District plant expansion is now an operating system.

Mr. Badalich, did you get that? The Sanitary District plant expansion is now an operating system.

SEWAGE REGULATOR DEMONSTRATION PROGRAM

The Sanitary District has undertaken, and is currently placing in operation, a $1.75 million program of planning and construction aimed at controlling the loss of polluted overflow from combined sewers during rainstorms. The program is acknowledged to be the first of its kind in the Nation and is being financed in part with a Demonstration Grant awarded by the Federal Water Pollution Control Administration under the provisions of the Water Quality Act of 1965.

The project consists of 43 remotely-controlled regulator gates, 42 sewer level monitors, 5 river quality monitors and 8 rain gauges located throughout the Twin Cities, with all components interconnected through a process control computer located at the District treatment plant. During a rainstorm in the metropolitan area, the complete system will function to reduce the discharge of combined sewage to the river until all of the conveyance and storage capacity of the sewer system has been utilized, and then determines which excess flow should be discharged to the river to minimize the pollutional effects. Completion of the project will provide positive computer control of the sewer system's key points to divert as much combined waste as possible to the District plant for treatment.

Construction and installation of the various components of the system are now complete, including the digital computer and its supervisory control equipment. Currently, the system is being tested, adjusted and tuned for "on-line" operation. While the programming and control techniques will require continued refinement over the next few months, the system is now in partial operation and will be effective henceforth in controlling water pollution caused by combined sewer overflows.

The present program of controlling combined sewer flows and overflows is expected to produce results which would be equivalent to a substantial separation program, but at a fraction of the cost involved and in considerably less time. The qualitative results of the program will be determined over the next two years and will be reported at the conclusion of the demonstration period.

AUTHORIZATION AND BEGINNING OF PLANNING FOR FURTHER PLANT EXPANSION

M. L. Robins

In the past few years, the attention of the public has been focused upon the water pollution problems of the Nation, and the Federal Water Pollution Control Administration is to be given credit for causing this attention to be focused throughout the Nation, because there were very serious situations arising not only in the Twin Cities area, but in other areas throughout the country. It was mainly through the focusing of this attention that these problems were brought to the cognizance of the public.

The general result has been a trend toward higher water quality objectives and the requirement for more advanced and efficient methods of treatment. The Federal Water Pollution Control Administration study of the pollution of the Upper Mississippi River and major tributaries contained recommendations for high levels of treatment and pollutional load restrictions which affect the Sanitary District treatment plant.

The Sanitary District continues to maintain its opposition to several restrictive features of the Federal Water Pollution Control Administration recommendations. These objections have been presented in written statements and memorandums to the February 1967 Federal-State Conference (dated February 27, March 6 and March 15, 1967) and in other subsequent communications with the Minnesota Pollution Control Agency.

However, the Sanitary District intends to cooperate fully in the control and abatement of pollution in the Mississippi River.

On December 18, 1967, the Board of Trustees of the Sanitary District directed its consulting engineers to proceed with the preparation of the preliminary engineering report and plans for a further plant expansion to accomplish 90 percent BOD removal capability by the Step Aeration Process.

These preliminary studies are now in progress.

AUTHORIZATION OF PLANNING FOR MODIFICATION OF SLUDGE INCINERATORS OF ORIGINAL PLANT

On April 8, 1968, the Board of Trustees of the Sanitary District authorized the budgeting of funds to cover the preparation of plans for modification of the sludge incinerators of the original treatment plant. These modifications will be designed to increase the flexibility of the sludge disposal works and to minimize the incineration capacity involved in any shutdown to accomplish repairs. This project will include the addition of major air pollution control equipment to the original plant.

SCHEDULE OF REMEDIAL PROGRAM-FURTHER PLANT EXPANSION

While the secondary treatment expansion has been utilized for some time under limited operation conditions and the Sanitary District is assured that treatment will be accomplished at least equal to the design basis, there has been only limited opportunity for an evaluation of the effect of the full-scale operation and improved levels of treatment on the river water quality. Before a design for a further plant expansion is finalized, the performance of the recent addition must be evaluated to arrive at suitable and economical design parameters.

Even more important is the development of a sound design basis for expanded sludge disposal works. It is a technical necessity that the loading and production criteria associated with sludge processing and disposal be based upon actual performance of existing units over a period of time.

Based upon the accomplishments of the Minneapolis-St. Paul Sanitary District and in recognition of the favorable status of the plant expansion program, the District urgently requests a modification to the Remedial Program Schedule in order to demonstrate the performance of the newly constructed secondary treatment works and to permit a full evaluation of the effect of the new plant on the Mississippi River.

The proposed schedule is as follows:

Engineering Report and Preliminary Plans	by June 17, 1969
Final Plans and Specifications	by June 17, 1970

M. L. Robins

Complete Financial Arrangements, Award Contracts and Commence Construction	by September 17, 1970
Complete Construction and Place in Operation	by September 17, 1972

This schedule for the completion of a further plant expansion by September 1972 is consistent with similar schedules set in a number of other comparable areas. The Sanitary District urges its adoption for the Minneapolis-St. Paul area.

Now, with regard to the table attached to my report. Have no fear, I am not going to read the entire table, gentlemen, but I would wish to point out that the total construction cost, summarizing the table, is $26.378 million, and includes all of the items which we have mentioned in this report, the chlorination system, a modification of the chemical system and the other things which are mentioned in the tabulation.

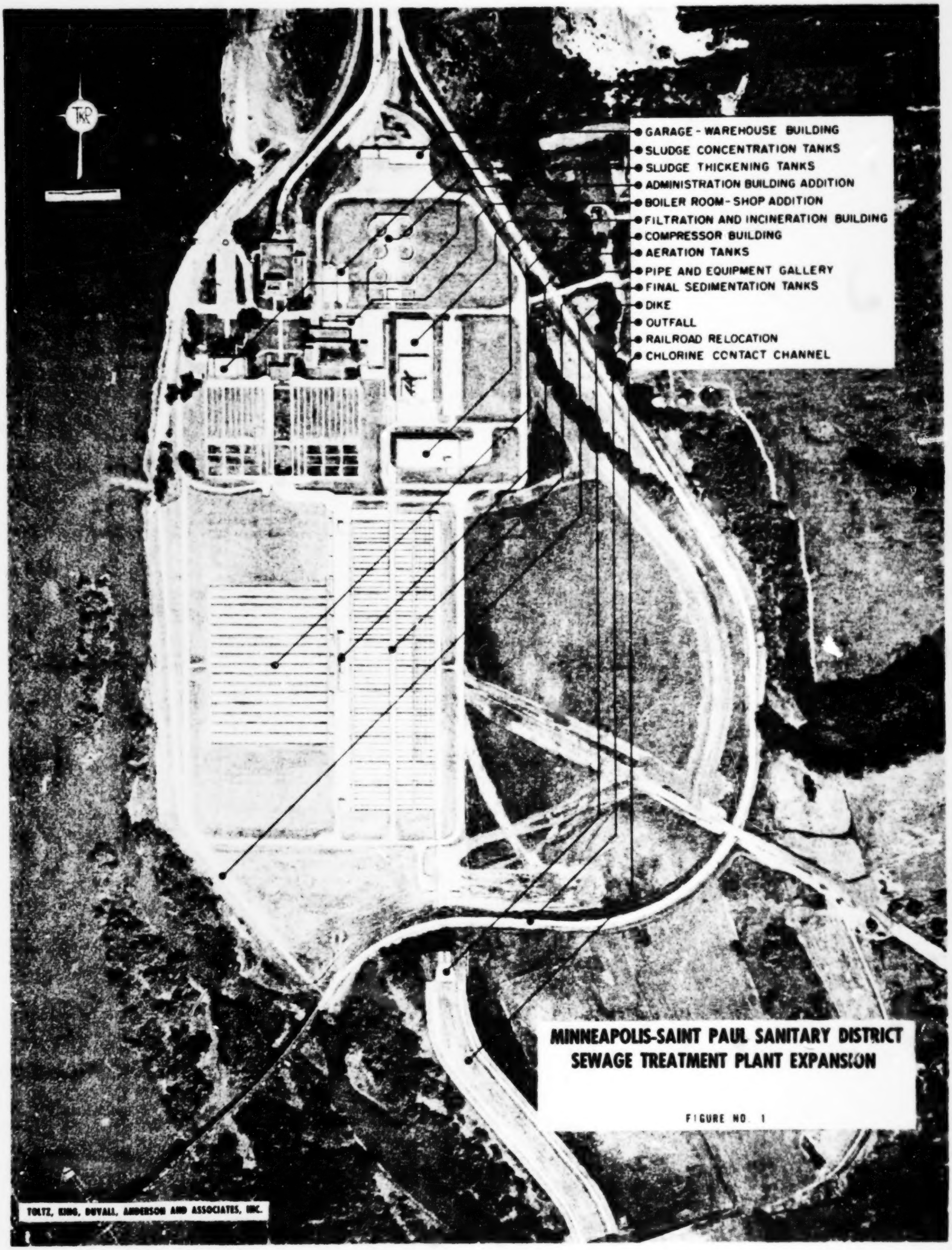
I want to thank you gentlemen for the opportunity of giving this report.

I also want to thank Mr. Badalich for the thirty-day notice which we received on April 18th.

Thank you.

STATUS OF
SEWAGE TREATMENT PLANT EXPANSION

Project	Approximate Construction Cost	Present Status
Railroad Relocation	$ 223,000	Completed and in operation
Site Clearing and Demolition	145,000	Completed and in operation
Garage and Warehouse	187,000	Completed and in operation
Aeration Compressor Equipment	395,000	Completed and in operation
Dike Construction	199,000	Completed and in operation
Aeration Tanks-Gallery-Final Tanks	8,263,000	Completed and in operation
Diesel Electric Generator	85,000	Completed and in operation
Boiler Room and Shop Addition	414,000	Completed and in operation
Compressor Building	2,026,000	Completed and in operation
Administration Building and Laboratory	566,000	Completed and in operation
Instrumentation & Control System (PH. 1)	213,000	Completed and in operation
Sludge Vacuum Filtration Equipment	701,000	Completed and under test operation
Non-Potable Wells	22,000	Completed and in operation
Sludge Incineration Equipment	2,108,000	Completed and under test operation
Filtration and Incineration Building	5,033,000	Completed and in operation
Chlorine Contact Channel	310,000	Completed and in operation
Sludge Concentration Tanks	343,000	Completed and in operation
Screen and Grit Chamber Modifications	849,000	Completed and in operation
Flood Protection Improvements	163,000	Completed and in operation
Sludge Thickening Tanks	2,217,000	Completed and in operation
Instrumentation & Control System (PH. 2)	858,000	Completed and in test operation
Chlorination System	500,000	Final plans near completion
Site Development & Miscellaneous	444,000	Contract awarded-construction begun
Modification of Chemical System	114,000	Plans in progress
Total Construction Cost	$ 26,378,000	


TKR
GARAGE - WAREHOUSE BUILDING
SLUDGE CONCENTRATION TANKS
SLUDGE THICKENING TANKS
ADMINISTRATION BUILDING ADDITION
BOILER ROOM - SHOP ADDITION
FILTRATION AND INCINERATION BUILDING
COMPRESSOR BUILDING
AERATION TANKS
PIPE AND EQUIPMENT GALLERY
FINAL SEDIMENTATION TANKS
DIKE
OUTFALL
RAILROAD RELOCATION
CHLORINE CONTACT CHANNEL

MINNEAPOLIS-SAINT PAUL SANITARY DISTRICT
SEWAGE TREATMENT PLANT EXPANSION

FIGURE NO. 1

TOLTZ, KING, DUVALL, ANDERSON AND ASSOCIATES, INC.

MR. STEIN: Thank you, Mr. Robins.

Don't run off. Someone might have a question.

Are there any questions or comments?

MR. ROBINS: Mr. Stein, I was just getting off the platform. I didn't want anyone to think that I was shaking in my boots.

MR. STEIN: No one ever figured you were shaking in your boots.

By the way, this is a very good report. For the most part, except for one question which Mr. Wisniewski whispered to me before, and which I would like to clear up with you, I think it is very very clear and the issue is joined.

This is one thing we can say about the Minneapolis-St. Paul Sanitary District, that we have no doubt as to where they stand. It is always very illuminating to deal with them, because I think we can understand their position and they can understand ours.

There is one point here that I would like to particularly commend, and that is that sewage regulator demonstration program for the elimination of storm sewers.

We have looked at several other big cities, and I wish they would employ that sewage regulator demonstration program.

As a matter of fact, independently, we have looked at some other cities and we have come up with a recommendation which almost duplicates the program that you have worked out. You have worked this out yourself and put it into operation without any urging, and I think that process is to be commended.

There is one other point I want to bring up here. In your last sentence you state:

> "This schedule for the completion of a further plant expansion by September 1972 is consistent with similar schedules set in a number of other comparable areas."

What do you mean by "other comparable areas"?

MR. ROBINS: Rather than me answer that, Mr. Stein, why don't you answer that?

MR. STEIN: I am just relaying Mr. Wisniewski's question.

As I understood it, his point was that when we were here several years ago we gave a three to four-year time schedule. Always, when you do this, the three-year time schedule seems to get ignored, and then we kind of wind up with the four-year one.

You are now asking for another year, and that makes it five years.

The question raised is, what do you mean by "other comparable areas"?

I don't know that we have really in any enforcement case that I know of, with few exceptions, gone much beyond the four-year time schedule.

MR. ROBINS: Isn't this true of the New York area, Mr. Stein?

MR. STEIN: In New York, where? New York City?

MR. ROBINS: Yes.

MR. STEIN: You have pointed out that your total expenditures here are $26.378 million and a lot of these are completed and are in operation already.

In the New York area, we are dealing with a plant that is going to cost $220 million, which is ten times as much, and they have the problem of getting it through some of the most thickly populated areas in the country, having problems that you, thank goodness, do not have here, and putting a good portion of that plant and piling it in the Hudson River, and not putting it on land. There are some very special circumstances.

I think you should be grateful that you do not have a problem of that magnitude in dealing with this.

Maybe you want to equate the time schedule in one case against the other. I am not sure that this can be done. After we recess, we are going to listen to the Minnesota recommendations very carefully on this.

Let me ask you just one question and throw this open.

As I understand it, there is really no substantial difference between your proposals, the requirements of the State, the requirements of the Federal Government, and the requirements of the conferees, including the downstream State of Wisconsin, other than the extension of time. Is that a fair statement?

MR. ROBINS: Yes.

MR. STEIN: I don't want to quibble. All right.

MR. ROBINS: Except for, let me say, the more or less minor objections which we have presented.

MR. STEIN: Yes, except for the chlorination.

MR. ROBINS: Yes.

MR. STEIN: But I am talking about general treatment and reductions of the waste load.

MR. ROBINS: Right. We are in substantial agreement.

MR. STEIN: Yes.

MR. ROBINS: The only thing that I would like to point out as the reason we asked for the proposed schedule is explained in the two or three paragraphs just ahead of that request, and that is that we wish to obtain an evaluation of the present process and what it can do, in order for us to get a sound basis for our engineering plans.

This is going to require a little bit of time for us to operate this plant in the present capacity. If we do this, we have to have twelve to twenty-four months at least to obtain these values.

You must remember that this process is new to our personnel. We are dealing with people who are unacquainted with the process. We give them as much guidance as possible.

However, it is unrealistic for the engineering staff to be there twenty-four hours a day, so consequently we rely upon their intuitions and their gaining of this experience.

Possibly for the first six months' operation of the full complete system, they will not be as knowledgeable of the exact moves to make, so consequently that six months data may be valuable, or it may not be valuable for us to use it for a future evaluation.

MR. STEIN: I understand your point. I am not trying to argue this.

MR. ROBINS: No.

MR. STEIN: Because I do think that we have an approach from the District that has certainly the same objectives as we do. You are proceeding on this in a thoroughly professional manner. Any problems or differences that we may have come from honest professional differences, if there are any.

Here you say, "It is a technical necessity that the loading and production criteria associated with sludge processing and disposal be based upon actual performance of existing units over a period of time." Then you say it might be twelve or twenty-four months.

I am going to ask the other conferees to address themselves to this and consult on this, because I have an open mind on it.

When you say "upon actual performance of existing units over a period of time," this may stretch to two years, or it may stretch to three years. No one can tell at this stage when you are going to get "actual performance of existing units over a period of time."

This is the kind of open-ended operation that, as regulatory agencies, we have to sometimes look into.

Theoretically your point is correct. We should really wait until you have actual performance of existing units based on a period of time which will permit everyone to move forward.

We always run into this. I don't care whether you are running a sewage treatment plant. Every manufacturing outfit—and I don't know how many manufacturing people are represented here—every steel firm, every automobile firm, every chemical operation, every paper operation—and these are the industries that I know of—always have the men in the laboratory who want to sharpen up the criteria for another six months or a year, and the people who are interested in sales and profits say, "There has to be a time when we have to stop this stuff in the laboratory and get into production."

We have to strike a balance. Again, this is what I would ask the conferees to consider.

I think you have raised a very fundamental question, but it is a question of how long we let this go on until we know what has to be done.

I am sure you have men on your staff, and we have many men on our staffs, who would never be ready to go. They would always be checking for another six months' data or another year's data to be sure that we are ready to come up with the answer.

MR. ROBINS: Well, Mr. Chairman, I do not think there are people on our staff who wish to drag their feet on this question at all. I think we are progress-minded and we believe in finalizing the situation, but we certainly do not like to go ahead without a full evaluation of the present process.

At this time, as long as you did bring this up about the schedule, I would like to ask Mr. Walter Thorpe of the firm of Toltz, King, Duvall, Anderson and Associates, our consulting engineers, if he has anything to say regarding this.

Would you, Walter?

MR. STEIN: While he is coming up, I know that you are an operator and you don't deal with dragging your feet, and

I am not suggesting that anyone is dragging his feet.

We have these people in every industry. They are the research people, and maybe there are some here.

Maurice, did you ever run into a research operation or an evaluation operation where the answer, after they got through at the end of this, was, "Okay, let's go," or the answer was, "What we need is further research and further study"?

In everyone I have run into, they have come back and said, "What we need is further research and further study."

Yes, Mr. Badalich?

MR. BADALICH: Mr. Chairman, before we get to Mr. Thorpe, may I ask this?

Mr. Robins, actually, what you are asking then in your presentation here is that due to the fact that your secondary facilities are now just going into operation, you would like to have the same period of time as outlined in our conferees' recommendations of the six to twelve months for submission of preliminary plans, and so forth?

MR. ROBINS: Yes.

MR. BADALICH: In other words, you want this full schedule with a year's delay?

MR. ROBINS: Right. Actually, what we are talking about here is this first part, the engineering report and preliminary plans, because the rest of the schedule then will fall in line.

MR. STEIN: In other words, you are a year behind on that, aren't you?

MR. ROBINS: No.

MR. STEIN: You are not going to be finished by 1971. In other words, you have asked to push the whole thing back, to have complete construction and place in operation by September 17, 1972.

As I understand the dates of the original conferees, that last date, which was the operation date, was June 17, 1971, which gives you one year and three months extra.

MR. ROBINS: Actually, that is based upon the original recommendations, isn't it, Mr. Chairman?

MR. STEIN: The original recommendations, as I understand, unless I am mistaken, call for completion- that last step which is the crucial step, to be completed by June 17, 1971. You are fifteen months late.

MR. ROBINS: I will let Mr. Thorpe comment on that.

STATEMENT OF WALTER THORPE, TOLTZ, KING, DUVALL, ANDERSON & ASSOCIATES, CONSULTING ENGINEERS, ST. PAUL, MINNESOTA

MR. THORPE: I believe the point I want to make has essentially been covered by Mr. Badalich's question.

The schedule really is one of the advancing the preliminary stages by one year, which means that the final construction and placement into operation will be delayed approximately one year from the original schedule.

MR. STEIN: Yes.

MR. THORPE: What we are asking for is additional time in the preliminary stages to evaluate the performance of the plant.

MR. STEIN: Yes, we recognize that.

By the way, I will say that we have considerably narrowed the issue. If there is any difference on this, let me hear from you.

In other words, there is not any difference about what has to be done. The sole question that we are faced with, as far as the District is concerned, is the timing.

MR. THORPE: That is correct.

MR. STEIN: Except for the minor matters which we recognize and will take up too, I hope, which Mr. Robins has indicated.

However, on the basic issue, unless someone has anything to say, I think that the State of Wisconsin, the Federal Government, the State of Minnesota and the Minneapolis-St. Paul Sanitary District, are all in agreement in the decision on what has to be done. The question is when it is to be done.

As I see this, the ultimate delay will run about fifteen months, and the engineering report and preliminary plans call for a year's delay.

This is the only real major issue.

Are there any further comments or questions?

MR. POSTON: I would like to ask Mr. Robins, in the plant that has been recently completed, when will this plant be at its design capacity without any expansion of the facilities?

When was it put into operation?

MR. ROBINS: When was it put into operation?

MR. POSTON: I want to know when it is going to reach its design capacity.

MR. ROBINS: As far as the flow capacity, our present average flow is running close to 200 million gallons a day. The design capacity for the expanded plant is 218 million gallons a day.

MR. POSTON: This means that probably in a very short time, within four or five years, it will have reached its capacity hydraulically?

MR. ROBINS: Yes. This is why we realize that we have to actually see if there is a 90 percent BOD removal, and this, of course, is recognized by the engineers that started the initial investigation.

MR. POSTON: In this new facility, as I understand it, you are getting design capacity or designed results?

MR. ROBINS: Designed efficiency.

MR. POSTON: Plus?

MR. ROBINS: Plus one or two percentage points.

MR. POSTON: That is all I have.

MR. ROBINS: Thank you.

MR. STEIN: Are there any further questions or comments?

MR. GADLER: I would like to ask a question.

MR. STEIN: Yes.

MR. GADLER: I would like to find out about the monitoring of the rainstorms in the metropolitan area. How does that affect St. Paul?

MR. ROBINS: The monitoring? I didn't get the question.

MR. GADLER: On the sewage regulator program --

MR. ROBINS: Yes.

MR. GADLER: You said you have all these facilities to monitor and control rainstorms.

MR. ROBINS: As far as the monitoring, there are five monitors.

MR. GADLER: Does it apply to St. Paul?

MR. ROBINS: It applies to the entire metropolitan area.

MR. PACKARD: Have you gone into separated for sewers

MR. ROBINS: We hope to achieve this by going into a complete separation program which will be a much more economical method and a much more attentive method.

In other words, the fact that the system is reaching its capacity will be indicated right at the plant, and if there are any discharges, those will be known right at the control system at the plant.

MR. GADLER: Are you saying that the City of St. Paul does not have separated sewers?

MR. ROBINS: I cannot speak for the City of St. Paul. I speak for the Sanitary District and the interceptor system is somewhat different.

The City of St. Paul has the distribution system. Ours was the collection system and the interceptor, and this is what we are concerned with.

MR. PACKARD: May I add a further comment?

MR. STEIN: Yes.

MR. PACKARD: Did not the report of the City of St. Paul say that they were anticipating rather than a separation of the sewers, a treatment of the stormwaters entering the river?

MR. STEIN: Yes.

MR. ROBINS: Actually, they hope to combine their facilities and their efforts along with the results of this regulator demonstration program.

MR. STEIN: There are two different approaches to handling the stormwater system.

MR. ROBINS: You see, inasmuch as this system is not operating or we do not have the results of any operating data on this system, we cannot say at the present time how it will affect either one of the two cities.

MR. GADLER: The reason I asked the question was simply that if the combined sewers are not operating and this system of yours is not operating, then you are going to discharge a lot of polluted sewage into the river during a rainstorm.

MR. ROBINS: This will happen with any system if you do not have a safety valve someplace.

MR. GADLER: Will separation help?

MR. ROBINS: Yes, it will.

Actually, what we are talking about is economics, and there is no necessity for them or the City of Minneapolis to go any further with a separation program until this system has proved itself out.

MR. PACKARD: By the same token, from what you are saying, is it not true also that along the line of the St. Paul proposed system rather than separation, if you have a critical situation because of heavy rainfall, you also minimize the pollution because you have that much more dilution?

I don't say necessarily that this is the right answer, but, nevertheless, it ends up with a condition at the river that you want, and as long as they can take care of it, they do.

MR. STEIN: That is the situation we have here. That is the theory they have been working on.

The whole theory of the combined sewers was that when you got a rainfall you would have enough of a dilution factor where the wastes could run into the river without treatment, but so diluted that it would not create too much of a problem.

With the growth of the cities and the increased strength of the wastes, this has proven to be a false hope. You have this problem again and again.

We have two approaches that they are using here. Mr. Robins points out that what they are trying to do is set up a computer system, and once you get a rainfall, to use every last ounce of that system both in the capacities of the sewer and the plant and the primary tanks, to take every last ounce of that rainwater and run it through the system before they will begin to bypass.

There is one big danger to that, of course. When you are running on these peak capacity operations, you may slug in a little too much hydraulic load, and you may push out some of that sludge, and the cure may be worse than the disease. In other words, you are playing with dynamite. If it does not work and you get some of that stuff out of the tank, you have a problem.

Mr. Avery, on the other hand, has had a series of devices where he is going to store that material, and then run it through the treatment plant and treat it.

The kind of thing that Mr. Robins has indicated is something that you can put into effect right now, and presumably it can work, but again, as I say, you are on the brink all the time.

The kind of thing that Mr. Avery suggests looks to everyone like a system that is theoretically feasible, but, to my knowledge, there has been no large-scale operation of that kind up to this point.

Let me go off the record.

(Discussion off the record.)

MR. STEIN: Let's go back on the record. There are two things you have to determine. We have been through this.

The first is that in order to handle the stormwater

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problem with a complete separation system, the costs are going to be tremendous. There is not only the cost, but you have the ripping up of the streets and the impediment to automobile traffic and normal business in a city over a period of years, which is going to be very, very severe.

What these people are looking for is a reasonable alternative that is going to allow them to dispose of the stormwater without going into these very large expenditures, or causing the disruption to the urban life in the Twin City area. This also applies to other cities.

When we came up to the Congress with a proposal for a stormwater separation problem, they looked at the consequences, which consisted of both the vast expenditures of money in the relative sense and the disruption of urban life. Congress said, "Before we embark on a program like that, let us set up a demonstration program to see if we can achieve pretty much the same kind of result without using these drastic measures."

Congress has the feelings that we all have about this.

M. L. Robins

In response to that, St. Paul and the District both have come up with what they consider reasonable alternate plans to handle the stormwater problem without going to the tremendous expense and the disruptive technique of completely separating the sewers.

From the point of view of where we stand, I don't think anyone can come up with a definitive judgment on where this is. The reason we don't all come up with pretty uniform plans as we do in sewage treatment plans is that we really don't know what the best alternative is. We are letting the various cities throughout the country have this. In Chicago, Philadelphia and St. Louis, they all may have various plans, as you have just heard here.

What we have to look at it seems to me, are these two plans represented by these two groups reasonable alternatives that should be given a trial? These people believe in them. Let's see if this can work.

If all hands were agreed that there was no choice but to have complete separation of the sewers to prevent a severe pollution problem, and if it were just economics, I guess we all would have to tighten our belts and meet that program. The point is that no one really is that knolwedgeable yet until we go through the theory of experimentation, and then it might work.

In Chicago we had another problem that is just about completed. It will eliminate the storm sewers, but it is going to cut down the flow to about 4 or 5 percent of what we had before and put it out at the street discharge points, where we won't cause too much damage. If it works, it is certainly better than having ripped up the whole downtown City of Chicago. We have enough problems without that.

MR. GADLER: Based on this program that Mr. Robins suggests, it appears to me that this is an excellent approach that he and his staff have taken, and I am wondering whether that means that you are going to agree to give them an extra year?

MR. STEIN: No, I am not sure that that approach they are taking on the stormwater problem side has anything to do with the extra year. These are two separate problems.

As a matter of fact, I will give you my personal view. I think the stormwater approach, both from St. Paul and the District, are both among the most sensible approaches that I have seen, but I don't think this relates to their regular treatment.

I think Mr. Robins would agree with that. They are two separate programs.

MR. ROBINS: If I may condense all of this into this statement, Mr. Gadler, it does not rain in all areas of the Metropolitan District at one time, so the idea behind this type of a program is to utilize the full capacity of the interceptor system as a storage reservoir, and then, with this computer and control system, allow the flow to come down in the interceptor, flow through the interceptor system at those times at which the flows can be brought into that section of the interceptor system without discharging any overflows into the river.

The economics I was speaking about were not related to the fact that we are concerned with what it is going to cost the taxpayer. We are concerned with why go into a sewer separation project if you can do it through this method in a much shorter period of time and with less money involved.

Any storm sewer separation project, as anyone in the engineering profession knows, is a very costly item. This, of course, doesn't cost pennies, but this type of a system is a much more economical approach.

MR. STEIN: Mr. Badalich?

MR. BADALICH: Mr. Chairman, I was going to say that one of the most important things of the regulators and the overflows in the interceptor sewers is the fact that they will capture the polluted waters in the sewer by virtue of the fact that we get the first flush coming into the sewage treatment plant, and then the material will be diluted to some extent; but you are taking care of a great pollution load by regulating these regulators at a point, as Mr. Robins states, and so it will be controlled.

MR. STEIN: Do you want to talk about that, Mr. Poston?

By the way, I agree with you, but Mr. Poston has been whispering in my ear that while you may take care of the first flush, the second question is really the one --

MR. GADLER: Mr. Chairman, I don't see where, if you have 10,000 tons of pollution to pour down the river, whether you pour it down diluted or not makes any difference. There are still 10,000 tons going down the river.

MR. STEIN: That is true, sir.

Here is the notion: We have a capacity in the plant that can handle just so much waste.

MR. GADLER: Of course.

MR. STEIN: When we have a storm coming in, we don't have the hydraulic capacity in the plant. As a matter of fact, if you attempted to push it through, you would ruin the biologic process of the plant.

Now, there is a lot of material that lies in the bottom of the sewer and keeps getting scoured out.

It does not rain in all parts of the District at once. If you can take the first five or ten minutes of rain, what you do, in theory, is you get the sewer scoured out with the dirtiest materials, and you put them into your interceptor capacity that you might have, or your storage capacity.

You have to recognize that in combined sewer treatment, generally speaking, with a combined sewer system you have a big pipe in dry weather with a little stuff coming out of the bottom. The combined sewer fills up with the rain from the street, and it all runs out with a series of valves and bypasses the plant without treatment.

The notion that Mr. Robins has, as I read it, is that using the primary tank capacity and this tremendous capacity of these big pipes, which, if filled up, can hold a lot of water, you can keep the water in that on a computer basis where you are not overloading the system. Theoretically, you get the strongest stuff out of the sewers after the rain abates and you actually bleed that into the system, treat it and run it out and go on your way.

I am not familiar with the topography in the District, but let me put it this way: Let us suppose it rains in the north. If his system works, he can get that water down perhaps to a pipe in the west, in one of these big pipes, fill it up with water and let it sit there until they can absorb it in the plant. This is his theory, and to my mind I think it is a good one. I hope he can work it.

The conferees are going to have to determine whether they are going to give him a chance.

South St. Paul has a slightly different system which we heard, which is going to attempt to deal in another way with the same problem.

The question that I have to ask you, sir, is do we have an alternative? The alternative is full separation, and I don't know that anyone suggests that we go ahead with that.

MR. GADLER: I don't know. Mr. Avery has given a very fine paper here on that, and I know he spent much time on that problem in the City of St. Paul. He has stated here that he was thinking of partial separation, at least, but to get down to another way of saying it, if you take South St. Paul and the Twin City sewage and put all this stuff that goes down into the river, it means quite a bit of population equivalents going down.

MR. STEIN: Yes, sir, but here is the point: All that stuff is going into the river now.

MR. GADLER: Yes, sir.

MR. STEIN: The plans of both Mr. Robins and Mr. Avery are to keep a substantial portion of that out of the river by their methods, trying to keep the most virulent and most concentrated portion out after the storm.

Admittedly, this is not going to be the cure-all and you are not going to treat every bit of rain. The question here, though, is short of complete separation -- and, by the way, complete separation is not going to be the dream that you think, because if you are paving all these streets, even if we have the separated sewers system, I am not sure that you can discharge material from your completely separated sewers into the stream without any treatment and expect that you are going to have a clean stream -- so the notion is that for our time and what we are doing now in our lifetime, or, I will say, for the next twenty years, if we are going to have a cleaner Mississippi and Missouri River in the Twin City, what they are proposing is a plan to provide what we call secondary treatment for municipal wastes and comparable treatment for industrial wastes, chlorination during the recreation season; and the next point is to come up with a reasonable program that can be put into effect within the foreseeable future that is going to ameliorate the stormwater problem and ameliorate it significantly.

This is both their proposals. Both are going ahead in a different way.

By the way, I don't want to say whether Mr. Avery's program or Mr. Robins' program is better. As a matter of fact, both of these programs might be best for the particular city with the suburbs they have, and the topography of the area.

I am not sure, if you wanted to tailor an alternative to the separation program to these two cities, that you might not come up with the programs they have come up with.

We have found that in some places they can do it with surface storage. Some places can do it with underground layers.

Chicago has a two percent grade and they build deep tunnels. Maybe that is the answer. I don't know.

However, everyone has to approach their systems slightly differently for the cure of the stormwater overflow. The reason for that is that this is a problem we inherited. We inherited these storm sewers from preceding generations. We inherited the system.

Mr. Avery didn't build his; Mr. Robins didn't build his; and what they are doing is trying to get up a specific to handle what is frankly a very bad situation. I am not sure that I can think of a better plan to separate than these people have come up with. Maybe there is one, but I don't know it.

MR. ROBINS: Mr. Chairman, I would like you to recognize that credit is due to the City of Minneapolis on their sewer separation program, the City of St. Paul, which is going ahead on a plan of their own, the City of South St. Paul, which is going ahead on a different plan, and the Sanitary District is going ahead, so we at least are trying a progressive attitude in this respect, and I think credit is due to these entities for at least going ahead and trying to solve the situation and keep the pollution out of the Mississippi River.

MR. STEIN: By the way, I would say that I think you have shown the most imagination in your stormwater program. I wish the other aspects of the program were as good.

MR. DAMON: Mr. Robins, I have one question.

This did not come through to me in your report. How long has your new secondary treatment plant been in operation?

MR. ROBINS: April 24th -- one week ago.

MR. DAMON: All right.

MR. ROBINS: Now, this was not intent. This was due to the fact that there were necessary sludge disposal facilities, sludge thickening facilities, a control system, and so forth, to be completed and put into service, and they had been put into test programs. This is why the delay up until the April 24th date, and just as soon as we were able to put the complete system into operation, it just so happens, just coincidentally, that did occur one week ago.

MR. STEIN: Are there any other questions or comments?

MR. PACKARD: I would just like to clarify one point in my own mind.

Is there not a feature to the treatment of the combined storm and sanitary sewage that might represent an advantage over the separation, in that in this way you do get treatment of the stormwaters which do contain pollutant elements?

MR. STEIN: You have raised a very good question. Let me take that on because this is a national question and a really theoretical question.

Some people have said that if you were going to design cities, what you would do is design a system where every bit of waste would go to the sewage treatment plant and be treated.

The problem that they have in the system we have now is that this does not seem too feasible to do. No one has come up with a plan.

You recognize that, generally speaking, the storm-water you get flowing off is a lot weaker and a lot more dilute than the dry weather flow.

MR. PACKARD: Yes.

MR. STEIN: The question here is whether you want to maintain a finishing plant which can do the job on your really concentrated kinds of wastes on a year-round basis and maintain that capacity to handle a kind of dilute waste, which probably will never need that degree of treatment.

Most of the people think that if you were to expand the capacity to handle the tremendous loads, you may get two, three or four times the capacity just sitting around all year, and perhaps sometimes for five or ten years, never doing a thing.

If you are thinking in terms of an activated sludge operation, which is a bacteriological process, you are not going to have that amount around, so you can't keep it going to handle the load coming in.

The best thinking they have now, if we are going to do this, is to maintain your activated sludge and secondary treatment and biological treatment for your dry weather flow, and probably, as Mr. Robins pointed out, take the rest of your stormwater and either discharge it without treatment or just give it primary treatment and a shot of chlorine before you put it out, because you don't need all these facilities to run it through.

The cost of maintaining that kind of activated material to handle wastewater, when it is not being utilized, over the years would be a tremendous question. I think almost everyone has come to this conclusion.

MR. PACKARD: One other comment, which is a difference perhaps in viewpoint from a remark you made, Steve, on 10,000 tons of pollution at a time of heavy flow.

If that is a parallel, then it could perhaps be argued that you should not chlorinate the water because chlorine is poison, but again, it is an assist to Mother Nature.

MR. STEIN: As far as I know, the chlorine gets absorbed, and once the chlorine is absorbed, when you put that in, you don't have any poison in it.

MR. PACKARD: I realize that. I know that.

MR. STEIN: But this is the thing that we should recognize.

MR. GADLER: Mr. Stein, I know this is a water pollution control meeting, but I do think at this time that Mr. Robins and his group should be complimented for the work they are doing in air pollution control. They are spending millions of dollars, and, certainly, that should be a matter of record.

MR. STEIN: I am glad to hear that.

Are there any other comments or questions?

MR. ROBINS: Mr. Chairman, I was wondering if Mr. Faricy has anything to comment with relation to the District program.

STATEMENT OF RAYMOND W. FARICY, JR., ATTORNEY AT LAW

MR. FARICY: Just one point, Mr. Chairman.

I believe there was a comment made to the effect that maybe we can wait before we decide whether there should be an extension of time. I just again call your attention to the point that the preliminary plans are due June 17, 1968, and if we are going to be moving, we should be moving now, and I think the conferees should take that into consideration and make a favorable recommendation along that line. We would certainly urge because of the fact that this extension of time be granted.

MR. STEIN: All right. Thank you very much.

Mr. Badalich?

MR. BADALICH: Mr. Chairman, do you want me to continue with the Minnesota presentation?

MR. STEIN: Yes.

MR. BADALICH: I have an indication from another person who would like to be heard. That would be Mr. Christensen of the S. B. Foot Tanning Company in Red Wing.

Mr. Christensen.

STATEMENT OF B. F. CHRISTENSEN, VICE PRESIDENT OF MANUFACTURING, S. B. FOOT TANNING COMPANY, RED WING, MINNESOTA

MR. CHRISTENSEN: My name is Bert Christensen, Vice President of Manufacturing of the S. B. Foot Tanning Company of Red Wing, Minnesota.

I have a very short statement as to our progress in the last few months.

State of Minnesota Pollution Control Agency.

Gentlemen:

As previously reported February 28, 1968, the S. B. Foot Tanning Company of Red Wing, Minnesota and the City of Red Wing have been preparing an application for a Research and Development Grant to be submitted to the Federal Water Pollution Control Administration. The formal application was submitted

March 15, 1968, and it is our understanding it has received a favorable review.

The extent of Federal participation in the project entitled "Aerobic Biological Treatment, Sludge Dewatering and Disposal, and Effluent Reuse for a Side Leather Tannery," is not completely known at this time. However, great interest has been shown in the project.

We expect to hear from the Federal Agency in the near future, and as soon as we do, the engineering firm of Greeley & Hansen and Polkowski, Boyle & Associates consultants will complete final plans and specifications for the building and operation of the treatment plant.

Thank you.

MR. STEIN: Thank you, sir.

Are there any comments or questions?

(No response.)

MR. STEIN: If not, thank you very much.

MR. BADALICH: Mr. Chairman, I have Dr. Demetrius Jelatis, the Mayor of Red Wing, who would like to make a statement.

MR. STEIN: All right.

STATEMENT OF DR. DEMETRIUS JELATIS, MAYOR,
RED WING, MINNESOTA

DR. JELATIS: Mr. Chairman, Members of the Conference:

I am Demetrius Jelatis, the Mayor of Red Wing, and I have a very brief statement I would like to make on behalf of the City of Red Wing.

I would like to include in the record a copy of last year's annual report of our waste treatment plant. I will just note briefly the main highlights.

The average treated flow in gallons per day is about 1.6 million. The average BOD of the influent in the last year was 199 parts per million BOD, which was treated to an effluent averaging 18 parts per million, with an average reduction of 91 percent.

Last November, the city started a 24-hour chlorination of the treatment's final effluent, and from that time a daily record has been kept, maintaining an average chlorine residual of 0.5 parts per million of chlorine, feeding an average of 50 pounds of chlorine per day.

On the 7th of March, we entered into a contract with a consultant for a detailed study of the storm and sanitary sewer separations at a cost of $17,500.

There is some question as to the necessity of maintaining continuous year-round chlorination, and even though we did start it during the winter, we feel that this should be considered in view of whether or not equivalent chlorination is provided by upstream communities. The recommendations, as I recall, require chlorination only during the summer months.

We are happy to see that the Minneapolis-St. Paul Sanitary District is finally getting their plant on-stream, and we encourage them to start the next plant.

Thank you very much.

(The chart referred to is as follows:)

RED WING WASTE TREATMENT PLANT
ANNUAL REPORT
1967

		1966		1967
Average Flow Gallons per day		1,665,022		1,635,649
Total Flow for year		607,733,000		597,012,000
Month of Highest Flow	March	65,052,000	April	64,940,000
Month of Lowest Flow	November	42,000,000	Feb.	40,500,000
Day of Highest Flow	March 19	3,348,000	March 11	3,816,000
Day of Lowest Flow	May 15	972,000	May 14	918,000
Average Cubic Feet per day of Grit and Screenings		10.9		13.0
Total Cubic Feet of Grit and Screenings for Year		3,965		4,754
Average B.O.D. of Influent P.P.M.		183		199
Average B.O.D. of Effluent P.P.M.		20		18
Average pounds of B.O.D. per day Influent		2,242		2,720
Average pounds of B.O.D. per day Effluent		266		246
Average Percent Reduction		88		91
Average Gallons of Sludge per day		4,392		4,597
Total Gallons of Sludge for year		1,603,150		1,678,050
Cubic Feet of Sludge Gas Produced		3,647,170		2,361,850
Cubic Feet of Sludge Gas Used for Heat		3,089,360		2,360,720
Cubic Feet of Sludge Gas Wasted		557,810		1,130

REMARKS:

In August the City of Red Wing purchased a new "FLEXIBLE" Truck-Leader Bucket Machine. With this machine, in the months of August and September we collected and removed 1,755 cu. ft. of sand and gravel that settled out in the 24" sewer lines running thru Levee Park before it entered the Lift Station.

On the 4th day of November the City of Red Wing started 24 hour Chlorination of the Treatments final effluent. From that date on we have kept a daily record and are maintaining an average chlorine residual of 0.5 P.P.M. feeding 50 lbs. of chlorine per day.

Waste Gas Meter does not work.

Prepared by
Keith H. McCleary
Chief Operator
Sewage Treatment Plant

MR. STEIN: Thank you, Mayor Jelatis.

I knew if I hung around here long enough I would live to see this day. You know, sometimes I see the opponents of this operation become the best advocates of pollution control. I never thought I would be around when I heard you ask us to consider having less than year-round chlorination, but I guess these things happen.

Thank you very much.

MR. BADALICH: Mr. Chairman, I think this concludes the Minnesota reports, unless there is anybody in the audience who wants to make a statement.

(No response.)

MR. BADALICH: Mr. Chairman, that concludes the presentation by the State of Minnesota.

MR. STEIN: I think we would like to caucus for a little bit, wouldn't we?

MR. BALALICH: Yes.

MR. STEIN: All right. We will recess and we will be back here precisely at 3:20.

(Whereupon a recess was had.)

MR. STEIN: May we reconvene?

We will attempt to summarize the conference point by point, and I think that we have unanimity of opinion among the conferees.

With some notable exceptions, which have been pointed out with specificity, there has been very, very significant progress toward the clean-up and abatement of pollution of the Mississippi River and its tributaries in the Minneapolis-St. Paul area. This goes for industries, for municipalities and for Federal installations.

As a matter of fact, all the Federal installations appear to be on schedule except for one, Nike Site No. 40 in Farmington, Minnesota.

In view of the reports we have had here, I think it would be appropriate for the Federal staff in Washington to get in touch with the Department of Defense and see if we can get that schedule moved up and expedited, so that all the Federal installations will be on schedule in cleaning up.

The conferees also wish to reaffirm the requirements which were laid down in the previous conferences concerning the degree of treatment, the pounds of BOD to be discharged, and other measurements, and the type and extent of disinfection that the effluent should be receiving.

The conferees would also expect that the communities -- and there are just possibly one or two in Wisconsin, but certainly the eleven in Minnesota -- get their preliminary plans for remedial facilities on file by this June, with possibly one exception. That is, in looking at the record of the Minneapolis-St. Paul Sanitary District, and in consideration of the fact that their plant has been in operation just one week, and the reasons for the delays were not any actions on the part of that District but on the part of the normal delays in getting equipment, a normal part of living in America in this day and age, that the submission of preliminary plans possibly could be improved by giving them a year's operation so they can design on the basis of that.

Therefore, we, the conferees, believe that substantial compliance with our recommendations will be met, and that the Minneapolis-St. Paul Sanitary District will submit their preliminary plans for remedial facilities a year from this date, which means next April 30th. Very shortly thereafter, we will have another progress session of the conference.

It is also expected that the completion date for all facilities, June 1971, will be met, and this includes the District's facilities.

We would expect that the District, in having this year's additional time for its preliminary plans, would come back at that time with a schedule for the other areas of compliance, which would cause the completion of the facilities by the June 1971 date.

Are there any other comments or questions or additions?

(No response.)

MR. STEIN: If not, I would like to thank you all for coming. I hope we will all apply ourselves to this, because I am not sure we have seen the ray of light at the end of the tunnel yet, and unless we are all going to get to work on this, we are not going to make it.

We ask the District and the other people here to meet us half-way, and if during the year you feel you want to talk about anything, Mr. Badalich's door, Mr. Poston's door, Wisconsin's door and our door is always open, and we are always ready to come here, and we are always ready to talk to you.

Thank you very much, and we stand adjourned.

(Whereupon, at 3:35 p.m., the conference was adjourned.)

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